UNIVERSITY OF PRINCE EDWARD ISLAND

CLAIMING GREEN TO EARN GREEN: ENVIRONMENTAL LAWS AND UNINHABITED ISLANDS—A CASE STUDY OF FANGJI ISLAND, CHINA

by

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A THESIS
SUBMITTED TO THE FACULTY OF ARTS,
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
DEGREE OF MASTER OF ARTS IN ISLAND STUDIES

CHARLOTTETOWN, PRINCE EDWARD ISLAND
JANUARY 2016

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Thesis/dissertation Title: Claiming Green to Earn Green: Environmental Laws and Uninhabited Islands – A Case Study of Fangji Island, China	
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Date December 1, 2015

Abstract

Although Island Studies has been recognized since the mid-1980s, what are often neglected, or merged into the general "island" concept are uninhabited islands (UIs). The world's growing population demands more space by claiming and exploiting uninhabited areas around the Earth, or even outer space while UIs are inevitably considered fair game. Over decades, some UIs became hotspots on sovereignty conflicts because of their borderline location. Recently, more UIs have been leased to private sectors as real estate or tourism resorts. They are, however, still small islands struggling with their vulnerabilities such as fragile ecosystems and limited resources during the development process.

For the purpose of strengthening UIs' protection and utilization, since 2003, China has started to establish its island protection act allowing individuals to utilize rationally UIs for a maximum of 50 years. Aiming at analyzing the opportunities and challenges of Chinese UI's development and respecting the ecosystem services they are providing, Fangji Island in Guangdong Province, China was chosen as a case study to carry out quantitative research. This goal is pursued in two steps: (i) by adapting the evaluation system pioneered by Ivandić and Telišman-Košuta to study Fangji Island; and (ii) by developing an approach capable of analyzing the case that examines current Chinese UIs legislation and sustainable development strategies. The result reveals that UIs are indispensable because the ecosystem goods and services they are providing are significant to the planet on which we live. Seemingly the Chinese UIs protection act is a significant progress in island protection history, but they are just sugar-coating economic approaches with environmental protection measures. Since any human activities may influence the

fragile island systems, lack of comprehensive guidelines on UIs development will possibly lead to their degradation or collapse. During the development process, a proper mechanism dealing with the UIs' carrying capacity, utilization management, and environmental education must be established, which requires the cooperation of government, island operators, voluntary organizations, and the public.

Acknowledgements

First, I must thank Dr. Palanisamy Nagarajan, my supervisor, an Emeritus Professor of Economics, Island Studies Teaching Fellow at the University of Prince Edward Island, and a pillar of diverse knowledge. I also owe a very deep debt of gratitude to Dr. Richard Campanaro, my internal thesis examiner. It is primarily through their efforts that I have completed this step of my master's degree journey.

My sincere thanks to the many scholars from whom I have had the honour of learning a great deal while completing this research: the aforementioned Dr. Nagarajan and Campanaro; UPEI Professor Coordinator of Master of Arts, Island Studies Program, Dr. Jim Randall; National Taiwan Normal University Professor, Huei-Min Tsai.

Before studying for this program in Canada, I studied Tourism Management in China with a Bachelor's background in tourism planning and hospitality management. Studying in the Island Studies Program at UPEI. I had a chance to learn diverse knowledge about small islands. A specific note of thanks to my supervisor Dr. Nagarajan, his class introducing the challenges of small island sustainability is the foundation of my thesis. Also, a note of appreciation to the late Dr. Barry Bartmann, his class about small island political issues inspired me to combine island tourism development, island sustainability and island political issues into this thesis research.

A big thank you to UPEI and the many campus community members, far too numerous to name, involved with the Island Studies constellation. To my fellow Island Studies colleagues, thank you for your friendships, learned opinions, and your enthusiasm.

Special thanks to my dear friend and Island Studies colleague, Mark Currie. He helped me to proofread and improve my writing skills.

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Study Purpose

With the rapid development of the global economy, the conflict between human beings and the environment is becoming progressively more severe and critical. At the same time, natural resources limitation accelerates the further exploitation and utilization of marine space, placing uninhabited islands in a strategic position in the near future. Correspondingly, China has established uninhabited islands protection acts since 2003 with continuous improvements. Uninhabited islands are mostly used as tourism destinations or as real estate sold to private interests around the world. In the first list of utilizable uninhabited islands in China, 107 out of 176 of them are tourism destinations suggesting that tourism is the main direction of uninhabited island development.

However, any human activity may cause an unpredictable or unintended effect on the ecosystem that provides irreplaceable services to the planet. Therefore, instilling the concept of ecosystem services into public awareness, balancing tourism development, and environment conservation, as well as avoiding unintended pollution are impending challenges for humanity that need to be addressed urgently. Confronting the growing pressure of human activities, studying uninhabited islands is necessary.

The first goal of this paper is to start a discussion that examines the importance of uninhabited islands and the opportunities and challenges they are facing on sustainability, given that the field of uninhabited island studies is relatively new. The second research goal is to find out the ultimate purpose of these uninhabited islands' protection acts and their future development. I shall demonstrate that the current uninhabited islands'

legislation system is leading China to a turning point in environmental protection which is an excellent opportunity for uninhabited islands. However, the approaches to uninhabited islands utilization and protection is an entirely economically-driven endeavour that is sugar-coated with environmental protection. Hence, the impacts of human activities may be unintended but are dramatic which result in large and unknown challenges. By analyzing the growing pressures of ecotourism development on Fangji Island in Guangdong Province, China, after field investigation and secondary source studies, certain problems will be discussed and valuable lessons will be provided to seek out a better way to sustain uninhabited islands' development.

Study Objective

In this research, Fangji Island in Guangdong Province, China was chosen as a study case in order to find out the current opportunities and challenges associated with the development of Chinese uninhabited islands. The leasee of Fangji Island started the construction of it to become a tourist destination on 2004, and it first opened to the public in 2005 (Figure 1). Up to this point, Fangji Island was considered to be one of the most successful uninhabited islands in tourism development in China.

Figure 1 Fangji Island Development History.

Source: Wang et al., (2011)

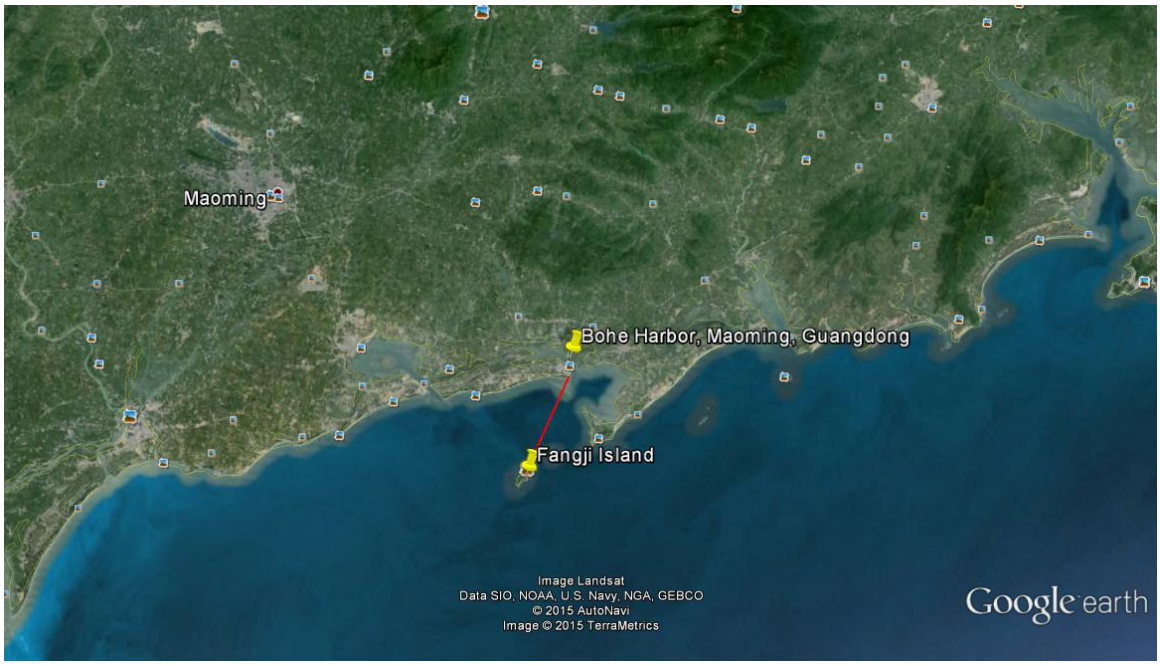
Fangji Island (E111° 10' 59.99", N 21° 22' 59.99") is located 13.8 km southeast of Bohe Harbour located in Dianbai County, Maoming (Figure 2). It takes less than 30 minutes for tourists to take the ferry from Bohe Harbor to the Island (Figure 3). Fangji

Island is located on one of the busiest sea routes in the South China Sea and is the only way from Guangdong Province to Zhanjiang, Beibu Gulf, and Hainan Province.

Figure 2 Location of Fangji Island.

Source: Maps of South China (Retrieved June 1st 2015)

Figure 3 Distance between Fangji Island and Mainland.



Source: Google Inc. (2015)

Total land area of Fangji Island is 1.9 km^2 covering about 95% of natural forests before development (Figure 4). Currently, the perennial vegetation cover on the island is maintained at around 80%.

Figure 4 Map of Fangji Island.

Source: Fangji Island Tourism Website (Retrieved June 1st 2015)

Study Background

What is an "Uninhabited Island"?

"Uninhabited Island" is a relatively new concept that emerged from the continuous research and conflicts on small islands. Therefore, the understanding of uninhabited islands should start from its definition. The definition of islands has been discussed for years while the widely accepted one was defined by the United Nations Convention Law of the Sea (UNCLOS), as follows.

> An island is a naturally formed area of land, surrounded by water, which is above water at high tide. Except as rocks, which cannot sustain human habitation or economic life of their own, the territorial sea, the contiguous zone, the exclusive economic zone and the continental shelf of an island are determined in accordance with the provisions of this Convention applicable to other land territory (Article 121, UNCLOS).

The definition of uninhabited islands, a sub-concept of islands, is more complicated than the definition of island itself. Because of the short history of uninhabited island studies, there is no official definition, nor has any precise number of uninhabited islands around the world been provided. Generally, uninhabited islands are islands that are not populated by humans. While the definition given by the 'Act on the Conservation and Management of Uninhabited Islands' in South Korea is that,

> Uninhabited island means naturally formed land which is surrounded by the sea and appears above the surface of the sea at flood, where no person lives (referring to settling and doing economic activities continuously; hereafter the same shall apply): Provided, That an island on which people live in the limited area only for reasons prescribed by Presidential Decree, such as the management of a lighthouse, shall be deemed an uninhabited island (The Minister of Oceans and Fisheries, 2007).

And the definition given by the 'The Law of the People's Republic of China on Island Protection 2009' is that,

> Uninhabited islands refer to the islands, which are not address registration places

for resident household management (People's Republic of China Standing Committee of the National People's Congress, 2009).

Under certain circumstances, the various definitions provided by different countries or institutions has increased the difficulty of counting uninhabited islands around the world. However, they share similar characteristics. Uninhabited islands were usually shown to the public in movies, stories or television shows about shipwrecked people and hermits. Moreover, it is generally used as a stereotype for the idea of paradise. The number of uninhabited islands in the world is definitely large, located all around the world while the primary countries that claim ownership of uninhabited islands, by world region include : (Fisher, 1999),

Asia: China, Bangladesh, Indonesia, Philippines, Maldives, South Korea and Japan.

Africa: South Africa, Kenya, Tanzania, Madagascar.

Europe: Netherlands, Denmark, France, Germany, Greece, Italy, Russia, Spain, United Kingdom, Portugal.

America: The United States, Venezuela, Brazil, Canada, Chile, Columbia, Mexico, Peru.

Oceania: New Zealand, Australia, Fiji, Micronesia, Palau, Solomon Islands.

From a literary perspective, Desert Island Literature has been one of the most important segments in British literature. Books using uninhabited islands as background include with the famous publishing of *The Tempest* written by William Shakespeare in the 1600s, *Robinson Crusoe* written by Daniel Defoe in 1719, *Gulliver's Travels* written by Jonathan Swift in 1726, *The Coral Island* by R.M. Ballantyne in 1900s and *Lord of the*

Flies by William Gerald Golding. There are indeed literary works that portray uninhabited islands as gateways to explore novelty as well as freedom. However, in reality, uninhabited islands are sometimes used as appalling prisons or insolated hospitals such as Alcatraz Island, Changuu Island and Robben Island because of their isolation and remoteness.

In reality, the primary characteristic of uninhabited islands is fragility. Compared with mainlands, uninhabited islands are small with their unique geographical environment such as transportation inconvenience, poor regional economy, higher investment in building infrastructure and a weakness to self-recover due to their relatively independent and closed ecosystem, vulnerable vegetation and surrounding marine life (Li, 2013). Another undeniable characteristic of uninhabited islands is no permanent residents living on the island that result in the absent of any supporting act. Just because uninhabited islands are not populated by human beings does not mean that they are not populated by other living things. Their original ecosystems still support a wide variety of living animals, vegetation, and other biologic elements.

Even though uninhabited islands can be a daunting places not suitable for human beings, they can also be wonderful places if someone knows how to reform them sustainably. That is also true in reality as in literature. Uninhabited islands are a great treasure to the world but also demand urgent attention for sustainable development and protection by researchers from various disciplines.

Why Uninhabited Islands?

Because this thesis studies uninhabited islands, it is significant that we understand their value and contributions. Varying significantly in size, climate, and geographic feature, it is known that all uninhabited islands are significant components of the earth as they are homes to a wide variety of species due to their isolated and unpopulated nature. Under the rapid development of the global economy and dwindling land resources, some islands have become "pearls in the ocean" with a high value on self-development or as a base of ocean exploitation, and are a new focal point and frontier in the World Arena. However, their fragile ecosystems require multidisciplinary sustainable strategies, which have already raised considerable concern among government and academic communities. As a result, legislation systems related to island management have been established in some countries for about a half century, including the 'Marine Resources and Engineering Development Act of 1966' in the United States, the 'Coral Sea Island Act 1969' in Australia', and the 'Island Promotion Act 1952' in Japan.

The growing interest in islands including uninhabited islands is the result of a variety of factors. They are as follows:

(1) World Trends in Sustainability:

Uninhabited islands are one of the most important components serving the world; that is to say, interest in sustainable development on uninhabited islands is increasing significantly. This has been shown in the development and direction of the Small Island Developing States (SIDS) (Briguglio, 1995; Douglas, 2006; Ghina, 2003). The United Nations has not published an official definition of SIDS, but according to their

characteristics, they can be defined as "coastal countries that shared very high levels of vulnerability on natural, economic and social systems, including smallness, remoteness, vulnerability to external (demand and supply-side) shocks, narrow resource base and exposure to global environmental challenges" (World Tourism Organization, 2012). The largest numbers of the uninhabited islands located in these areas are facing many challenges in future development arising from their shortcomings.

Small may be beautiful, but currently, SIDS are facing great struggles, in particular the environmental consequences of climate changes (Nath, Roberts & Madhoo, 2010). At the United Nations Conference on Environment and Development (UNCED) in Rio in 1992, the SIDS group was recognized as a special case, both for their environment and development. Since then, an increasing number of countries have taken part in the effort for small islands to attain sustainable development through the following acts:

Table 1 *Milestones of Small Island Developing States (SIDS) Sustainable Development*

Year	**Location**	**Name of Document**	**Introduction**
1994	Barbados	Barbados Programme of Action (BPoA)	Proposed specific actions and approaches should be taken in support of the SIDS sustainable development, at national, regional, and international levels.
1999	New York	Five-year review of the Barbados Programme of	Assessed BPoA comprehensively and called for support for the realization of SIDS sustainable development.

		Action (BPoA +5)	
2002	Johannesburg	World Summit on Sustainable Development (WSSD)	Called for political commitment from all countries to taking actions on further implementation of the BPoA.
2005	Mauritius	Mauritius Strategy of Implementation (MSI)	Discussed the further and successful implementation of the BPoA for the SIDS sustainable development.
2010	New York	Five-year Review of the Mauritius Strategies of Implementation (MSI +5)	Assessed the MSI and BPoA for the SIDS sustainable development.
2014	Samoa	Third International Conference on SIDS	Reaffirmed that SIDS remain a special case for sustainable development given their unique and particular vulnerabilities and that they remain constrained in meeting their goals in all three dimensions of sustainable development.

Source: Sustainable Development Knowledge Platform (n.d)

(2) Collapsing Island Ecosystem:

The ecosystems that we are living in including small islands, are facing enormous challenges on sustainability, which have been discussed by many scholars:

> Over the past 50 years, human have changed ecosystems more rapidly and extensively than in any comparable period of time in human history... approximately 60% of the ecosystem services examined during the Millennium Ecosystem Assessment are being degraded or used unsustainably, including fresh water, capture fisheries, air and water purification, and the regulation of regional and local climate, natural hazards, and pests (Millennium Ecosystem Assessment, 2005a, p. 1).

All these transformations have contributed greatly to the development of the global economy and human wealth, however, not all regions and groups of people have benefited from these shifts. Some of them, such as small islands, are suffering from devastating degradation and have already collapsed due to their vulnerabilities. The degradation of small islands indicates the negative influences on the Earth:

> Small islands are closed systems, and they represent a microcosm of the planet Earth, which is also a closed system on a planetary scale…we have been witnessing 'Easter Island Syndrome' signals; yet we continue to ignore them at our peril…if the current trends continue unchecked, many countries, particularly small islands, are likely to get caught in 'Easter Island traps' (Nagarajan, 2006).

> Continued global military and economic growth have had dire consequences for

the environments of small islands and have gradually spread to uninhabited islands while the global resource crises, coupled with the speedy pace of globalization and development, and the negative impacts of natural disasters, have exacerbated the collapse of small islands. Without a new paradigm of sustainability and systematic planning, current unsustainable trajectories will not be changed to healthy ones. Most problematic, the importance of uninhabited islands on providing ecosystem services should be widely known, but this usually comes last during any decision-making process.

Uninhabited islands are seemingly small but crucial. Regarding the small islands ecosystems, "due to the small size, isolation and fragility of island ecosystems, their renowned biological diversity is among the most threatened in the world" (United Nations, 1994). Due to the differences in their geological and geomorphologic setting such as biological, climatic, and ethnic characteristics; uninhabited islands have a distinct character and uniqueness, which is called 'insularity.' Uninhabited islands, as vital ecosystems in the world, are providing services to various living things visibly or invisibly, directly or indirectly, immediately or chronically. Their coastal, marine, and inland ecosystems provide valuable regulating, provisioning, and cultural services, such as biodiversity, fisheries, energy, fresh water, vegetation cover, traditional ecological knowledge, and tourism (Millennium Ecosystem Assessment, 2005b).

We are not just connecting to nature, but relying on nature. Nature provides us with a steady supply of the fundamental requirements for our daily life. The ecosystem that we are relying on is a complex biological chain that connects every entity systematically while the human being is only one of the countless species benefiting from and being affected by the ecosystem services. It is essential to remember that the ecosystem we are

living in is an entity; once any of the components collapses, the domino effect will influence every organism, inevitably including human beings. Without nature, it would not be possible to sustain human life, which is the fundamental principle we sometimes forget. Only after ensuring our consumption rate is no faster than the processes that nature produces, can we live sustainably.

Small islands are closed systems of the Earth living, and each can be considered as a microcosm of the Earth, as well as a testing field (Nagarajan, 2006). As a controllable unit, uninhabited islands are good for people to learn the services ecosystems provide as well as the impacts of human activities on the ecosystem. For example, a new island, containing a still-active volcano, is 1,000 km south of Tokyo, Japan. This island was formed after an eruption in November 2013. Even though this new island is totally covered by cooled lava, scientists say that one day in the future it will be full of plants and probably animals due to the evolving island ecosystem. It is believed by Naoki Kachi, professor, and leader of Tokyo Metropolitan University's Ogasawara Research Committee, that the key ingredients in forming the island ecosystem will be bird feces and vomit that will contribute to the formation of a nutrient-rich soil and colonization of any species.

As is shown above, the continuous efforts between the United Nations and SIDS on the sustainable development of small islands implies that special attention is needed to protect the environment when pursuing development. International and inter-regional cooperation, coordination, collaboration and technical exchanges in various fields are required urgently, and have been discussed by scholars for decades:

In the face of decreasing biodiversity and ongoing global changes, maintaining

> ecosystem functioning is seen both as a means to preserve biological diversity and for safeguarding human well-being by securing the services ecosystems provide (Jax, 2010, p. i).

However, since biodiversity and ecosystem services are public goods, the motivation to utilize them beyond optimum levels by private sectors is tremendous. Uninhabited islands ecosystems are increasingly faced with human impacts; therefore, it is worthwhile to pay attention to the importance of the uninhabited islands ecosystem services, which were usually neglected during social development. a good example is the disappeared islands in China. It is roughly estimated by the State Oceanic Administrative (SOA) of China that 806 islands have disappeared due to the excessive exploitation by human beings through practices such as sea reclamation, sand excavating and deforestation (Zheng, 2011). Understanding the role of biodiversity in the provision of services with demonstrable value to people, identifying the inter-relationships between people and ecosystems and embedding this information in decision-making are significant for establishing more sustainable biodiversity conservation policies.

(3) National Marine Rights and Interests:

Uninhabited islands are a symbol of national marine rights and interests. The locations of some uninhabited islands play significant roles in the jurisdictional conflict among different countries. It is commonly accepted that the 1982 United Nations Convention on the Law of the Sea (UNCLOS) provides the legal basis for sea exploitation, the right to allocate activities and the duty to protect the marine environment (Maes, 2008). UNCLOS shows a concrete and efficient regulation of marine rights and

interests:

> The sovereignty of coastal State extends, beyond its land territory and internal waters and, in the case of an archipelagic State, its archipelagic water, to an adjacent belt of sea, described as the territorial sea. This sovereignty extends to the air space over the territorial sea as well as to its bed and subsoil. The sovereignty over the territorial sea is exercised subject to this Convention and to other rules of international law (Article 2, UNCLOS).

Since the enactment of the UNCLOS, islands have become more vital in deciding territorial area and internal waters among those coastal and archipelagic countries.

(4) National Security:

Oceans not only connect continents and sustain cooperative interaction but can also be used as valuable resources safeguarding national security (Translated from Xiao, 2009). With increasing consciousness of frontier disputation, maritime security has become a vital component as well as important safeguards on the topic of world peace (Translated from Du, Fan & Gao, 2010). The security of uninhabited islands is involved in the sector of national security.

Firstly, the importance of uninhabited islands is evident in the safeguarding of homeland security. According to the UNCLOS, the territorial sea of an island is determined equivalently with the provisions of this Convention applicable to the other land territories (Article 121, UNCLOS). Therefore, uninhabited islands can be used as a natural barrier or a military base to counter the weakness of long distance defense. Once

these uninhabited islands are built as military bases, they will become strong lines of territorial defense.

Secondly, the importance of uninhabited islands gives greater assurance for resource security. UNCLOS has specific provisions, regarding the territory of an island:

> Exclusive economic zone (EEZ) is an area beyond and adjacent to the territorial sea, subject to the specific legal regime established in this part, under which the rights and jurisdiction of the coastal State and the rights and freedoms of other States are governed by the relevant provisions of this Convention (Article 55, UNCLOS).

Exploration and exploitation of all the living and non-living resources within the EEZ is allowed under the sovereign rights of a coastal state. It is estimated that 90 per cent of all commercially exploitable fish stocks and over 80 per cent of the world's known submarine oil reserves locate within the EEZs established by all the coastal states (Kim, 2004). Also, the continental shelves grant the coastal state sovereign rights over the continental shelves.

> The continental shelf of a coastal State comprises the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance (Article 76, UNCLOS).

Meanwhile, islands that can sustain human habitation or economic life of their own

shall enjoy the same right to another land territory, including the territorial sea, the contiguous zone, the exclusive economic zone, and the continental shelf of the island. That is to say, the sovereign state owns the island as well as an area extending 200 nautical miles around the island and control of the surrounding waters' fishery resources, tourism resources, mineral resources, and other renewable energy resources contained within that area.

Lastly islands ensure channel security, which includes navigation and other pipelines, such as submarine fiber, submarine cable, and submarine gas pipeline. Islands, located right between or among important areas, are essential stepping-stones in business and military development.

(5) Resource Base of Marine Economic Development:

Uninhabited islands are the base for marine economic development. The "ocean economy" is a relatively new concept that includes exploitation of the direct marine resources and the economic activities that indirectly rely on marine space. The sustainable development of an ocean economy can accelerate its offshore economic development level (Liu, 2004). For the purpose of bolstering the ocean economy and offshore development, featured industries within uninhabited islands are worthy of attention from any archipelagic countries as well as coastal countries.

Uninhabited islands are the material bases for marine economic development. Island resources include land resources together with invaluable marine resources. Vegetation on the island may be inhabited by specific kinds of species; an excellent location of an island may help people obtain an abundance of fish, oil and gas resources;

a good geographical condition and location of the island may have a high value for ocean transportation. Therefore, uninhabited islands are potential sites for deep-water ports, offshore oil and gas stations, deep-sea fishing bases, maritime travel destinations, and may also serve as primary gateways to other countries.

What Was Happening in Uninhabited Islands?

Uninhabited space and islands entered the story of global development when all the countries around the world were urgently looking for uninhabited areas to balance the limited resources on their land with the best example being Mars Immigration Project (Hoffman, Kaplan, & Center, 1997). On the other hand, uninhabited areas are often used as hideouts because nobody lives who might have an objection to criminal behavior. For example, there is a company in China that illegally discharges industrial waste into an uninhabited desert, believing that nobody will notice their crime (Zhuang, 2014).

However, following the exploitation history of uninhabited islands, island colonization was the starting point for island discovery around the world. European explorers discovered islands and started colonization and the plunder of resources. However, small islands, including uninhabited islands, were also considered as an important asset during World War II due to their superior geographical locations as stepping-stones to foreign battlefields. Many islands, including uninhabited islands were developed as military bases, including those listed in Table 2:

Table 2 *Examples of Islands Being Used As Military Bases*

Island	Location	Military Purpose
Oahu	Hawaii, U.S.	Pearl Harbor attacked by Japan on December 7, 1941, brought the United States into World War II. Now, it is the headquarters of the U.S. Pacific Command comprising Army, Navy, Marine Corps and Air Force service components.
Bahrain	East of Saudi Arabia	Bahrain, an important island country in regional security architecture, supported the International Security Assistance Force in Afghanistan, providing perimeter security at a military base (Source from U.S. Department of State Diplomacy in Action Website).
Guam	Western Pacific Ocean	Naval Base Guam is home base to dozens of Pacific Command, United States Pacific Fleet, Seventh Fleet, and Seabee units.
Malta	Southern Europe on the Mediterranean Sea	Malta used to be Britain's most important military base on the Mediterranean Sea until the independence of Malta in 1964.
Okinawa	South of Japan, East of China	Approximately 62% of U.S. bases in Japan are in Okinawa supporting U.S. military in the Korean Peninsula, Japan, and South China Sea area.

After World War II, the world was reshuffled as it headed on the track of peaceful development. However, the 'cold' war had just started. Islands had been used as borders between jurisdictions or acted as subnational jurisdictions for a long time due to several reasons given by Baldacchino (2010):

> Islands have a natural demarcation by geography as a piece of land surrounded by water; the remoteness and isolation of small islands cause lower accessibility and higher management to other offenders; small islands are less possible on competing territorial claims than mainland with less liable to internal ethnic "pillarization" (p.3).

Consequently, countries pay closer attention to the proclamation of their national territories including uninhabited islands since they are usually considered as boundaries relating to jurisdictional problems (Table 3). Similarly, countries in the West Pacific and South China Sea area are contesting islands with their advanced warships or even engaging in artificial island construction.

Table 3 *Examples of Contested Islands*

Time	**Purpose**	**Area**	**Issues**
Since 1880s	Sovereignty	Russia and Japan	Disputed over the Kuril Islands, also known as the Northern Territories dispute.
Source: Austin (2000)			
Since 1970s	Sovereignty	Japan, China, and	Disputed over eight uninhabited islands and rocks, known as Senkaku Islands in Japan and

		Taiwan	the Diaoyu Islands in China.
Source: Austin (2000)			
Since 1996	Sovereignty	Japan and South Korea	Disputed over two islets, called Takeshima in Japan and Dokdo in South Korea
Source: Fern (2005)			

However, the ultimate purpose of all these proclamations is to satisfy humanity's growing demand for more resources, and therefore, islands come to the stage with a new images: as income generators. Firstly, the abundant resources of islands and the surrounding sea area are a great treasure to humankind. Secondly, an uninhabited island itself is a valuable land resource that can be transformed into income by leasing or selling to private sector interests. Their increasing popularity is highlighted by the proliferation of economic activities as represented in Table 4:

Table 4 *Examples of Islands Being Used as Income Generators*

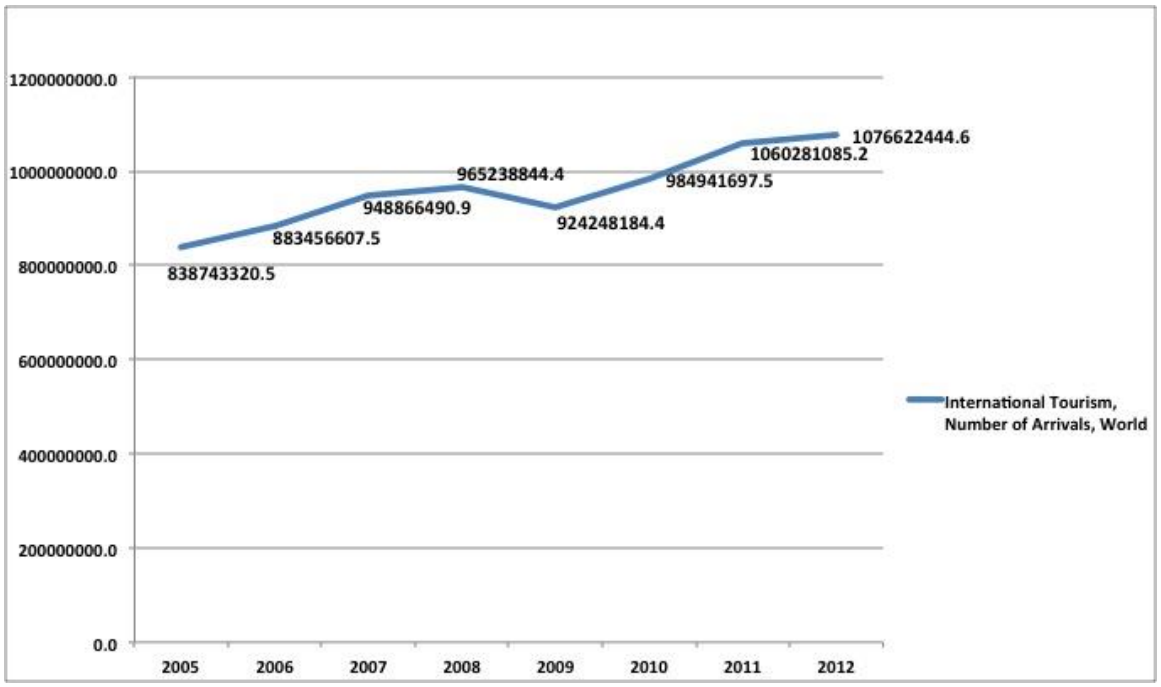
Year	**Purpose**	**Area**	**Issues**
2012	Economy	Greece	Greece has identified 40 uninhabited islands and islets that could be leased for as long as 50 years to reduce debt as pressure grows on the country.
Source: Smyth (2012)			

2014	Economy	Lakshadweep	Open three uninhabited islands for tourists. Tourism infrastructure will be built on islands at a total cost of 12 million US dollar.

Source: Lakshadweep Forum (2014

Tourism is one of the most popular ways to generate income in uninhabited islands. Some uninhabited island benefits—unique characteristics such as peacefulness, temperateness, and great privacy—could be used to transform their tropical paradise into successful tourism products. The '3S' (sun, sea and sand) designation has always denoted small island destinations appealing to numerous inbound tourists (Bishop, 2010). Globally, tourism is ranked fourth as an export category (World Tourism Organization, 2012). According to The World Bank, the number of inbound international tourists increased steadily and reached a peak in 2012 with 1,076,622,444 inbound tourists (Figure 5). For many developing countries, including SIDS, tourism is one of the dominant sources of foreign income and the number one export category, generating considerable employment opportunities for local communities (World Tourism Organization, 2012). Tourism in most SIDS contributes highly to their GDP, government revenue, foreign exchange and employment (Royle, 2001). In some cases, tourism contributes more than 40% of GDP such as 45.5% in Aruba and 47.4% in Maldives.

Figure 5. Number of Global International Tourism Arrivals.



Source: The World Bank (Retrieved May 1st 2015).

However, four key challenges that stem from the nature of the tourism industry have affected SIDS' tourism development including the division between land-based and cruise tourism, issues about economic dependence on tourism, issues regarding accessibility and competition between destinations (Hampton & Jeyacheya, 2013). All four of them can be applied to uninhabited islands as well. Whenever inhabited islands have been mostly urbanized and have gradually lost their features and fragile ecosystems, people have turned their attention to uninhabited islands. Even though islands have been increasingly studied by more and more scholars around the world, thereby contributing to different disciplines, uninhabited islands are often neglected in the previous literature, or merged into general "island" concepts.

The existence of uninhabited islands in the literature and the legislation system started with the island disputation in Asia-Pacific region. The island disputation among the relevant countries has lasted for a few decades, but no permanent jurisdictional treaty has been reached. What they are disputing are just a few small uninhabited islands or coral reefs. However, relative size does not mean they are insignificant. The ownership of these uninhabited islands may help the country gain abundant known resources and even benefits that are unknown at present (Van Dyke & Brooks, 1983). Therefore, these countries are showing their determination for uninhabited islands' protection and sustainable utilization by developing relevant legislative systems and funding associated academic research.

China is an appropriate example. According to the database provided on the China National Knowledge Infrastructure website (www.cnki.net), there are more than 500 articles with "uninhabited islands" as title words at the academic level that have been published since 2003, which is when China launched its first uninhabited island utilization and protection regulation. These articles were associated with various disciplines with different levels of credibility. Rough statistical data about "uninhabited islands" from related articles counted from the China National Knowledge Infrastructure are found on Table 5:

Table 5 *Statistics about 'Uninhabited Island' Academic Literature in China*

Research Level	**Number of Articles**	**Related Disciplines With Rough Number**
Doctoral Thesis	4	Oceanography (109) Law (91) Tourism (70) Economy (56) Environmental Science (52) Political Science (18) Physiography (9) Biology（5） Business (2)
Outstanding Master Thesis	22	
Journals	174	
Conference Reports	15	
Leading Newspapers	125	

Source: China National Knowledge Infrastructure (retrieved May 1st 2015)

In addition to Chinese research, scholars in South Korea and Japan also have a great interest in uninhabited islands. A particular uninhabited island legislative document in South Korea, 'Act on the Conservation and Management of Uninhabited Islands', was issued in 2007 with continuous revisions in recent years. Japan started their uninhabited islands management in 1953. Their research topics are similar to China's, with a high proportion written on sustainable tourism and environmental science topics. In one case, the carrying capacity of some uninhabited islands around South Korea were being estimated according to the emerging contribution of the marine ecosystem of the island (Nam, Chang, & Kang, 2010; Translated from Kang, 2010). Sustainable tourism models

in South Korea's uninhabited islands have been discussed by their current status and challenges (Translated from Choi, 2012; Translated from Seong, 2012). But mostly, researchers focus on uninhabited islands' abundant resources (Rho, 2010) and related management such as fauna (Katayama et al., 2013; Lim & Gang, 2011), flora (Translated from Park, 2007; Yang et al., 2003) and uninhabited island management policy (Translated from Choi, 2013; Translated from Ho & Kang, 2005).

However, the number of articles published in North America relating to uninhabited islands is much lower than in the Asia-Pacific region. Instead of being isolated, "geographies are socially constructed" supporting ideological or imperial purpose (Baldacchino & Tsai, 2014). It is positive that the importance for uninhabited islands will be greatly highlighted in the near future due to the increasing demand on unexplored resources. As a result, islands are usually considered to increase disquietude and contestation in island-mainland relations around the world (Baldacchino, 2010). Under certain circumstances, deeper insight into uninhabited islands is necessary.

Why Study Chinese Uninhabited Islands?

China has traditionally attached great importance to the land-based economy rather than the marine economy and for years that has slowed down marine development (Li, 2013). However, according to the records of the International Law of the Sea, China's sea area is about 3 million square kilometres with an 80,000 km^2 area of islands having a 14,000 km coastline shoreline. Abundant island resources, which occupy 8% of the total land area of China, support China's marine economies.

It is challenging to estimate an accurate number of islands in China because of the

vast sea area and the constantly changing geography. The first Island Resource Integrated Survey was conducted from 1988 to 1996 with a publication of the 'National Island Resources Integrated Survey Report' in 1996. This report showed that 6,961 islands in China are larger than 500m^2 and are located in five different provinces (Table 6). It also has many tens of thousands of islands that are smaller than 500m^2. According to a Xinhua News report in March 2011, in recent years, 806 islands have disappeared as a result of human actions or natural erosion (Zheng, 2011).

Table 6 *Number of Chinese Islands (>500m^2)*

Area	Number of Islands	Number of Uninhabited Islands
China (as a whole)	6961	6528
Zhejiang Province	3061	2883
Fujian Province	1352	1250
Guangdong Province	759	715
Guangxi Province	651	642
Shandong Province	296	261

Source: Translated from National Island Resources Integrated Survey Report (1996)

In the list of Chinese islands from Table 6, only about 460 islands are inhabited while most of the rest are small uninhabited islands (Translated from Sun et al., 2010). The number of these is decreasing dramatically due to geographic movement or vandalism. However, an officer of the State Oceanic Administration observes that even though there are more than 6000 uninhabited islands in China with abundant resources, compared to other countries, China's utilization and development of uninhabited islands is relatively

small (Translated from Guo, 2003).

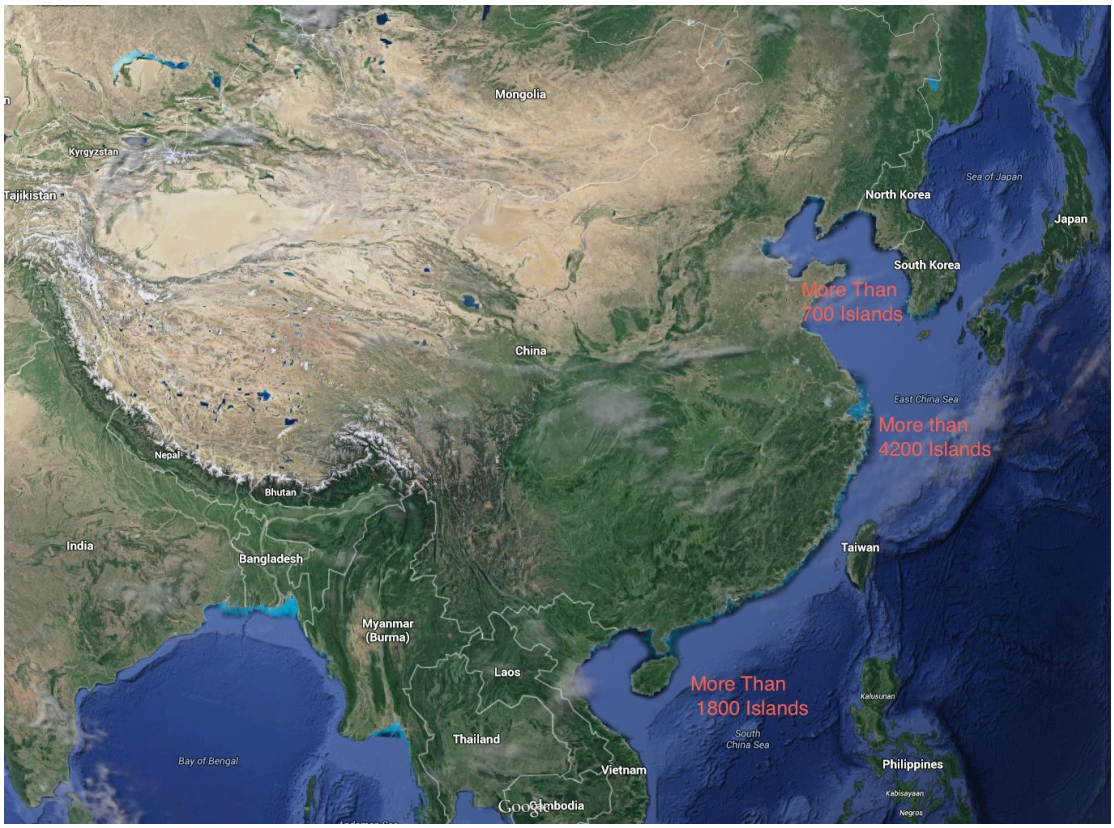
The 'National Island Protection Planning System' was an official document issued by the State Oceanic Administration (SOA) in 2012. It illustrates the current situation of Chinese islands. According to the document, there are more than 7300 islands (only islands with more than 500 m^2 in area were included) in China distributed throughout four main maritime zones (Table 7 and Figure 6). In this document, islands in Hong Kong, Macau, and Taiwan areas are omitted, as well as some contested islands. For the purpose of carrying on Chinese islands' protection and utilization, a more comprehensive Island database was needed, which induced the carrying out of 'The Second Island Resource Integrated Survey' starting from January 2012 with an estimated completion date of December 2016.

Table 7 *Chinese Islands Distribution by Provincial-level*

Sea Area	**Proportion of Islands (%)**
Bohai Sea	4%
Yellow Sea	5%
East China Sea	66%
South China Sea	25%

Source: Translated from the State Oceanic Administration People's Republic of China (2012)

Figure 6. Map of the Distribution of Chinese Islands.



Source：Google Inc. (2015)

According to the ‘National Island Protection Planning System’, three features of Chinese Islands are as follows:

1. They have small populations and a central distribution. Currently, there are two island cities, 14 island cities or districts, and 191 island counties. There were about 5.47 million (Hong Kong, Macau, Hainan, and Taiwan are not included) people living in the above island areas in 2007.

2. They have low GDP and a lack of structural diversity. The island GDP in 2007 was about 223.8 billion Yuan, which was only 1.4% of the total GDP among all coastal provinces. Fishing is the main industry in island areas.
3. There are multiple use of uninhabited islands. More than 1900 uninhabited islands have been used for different purposes (Table 8).

Table 8 *Current Uses of Chinese Uninhabited Islands*

Purpose	Number of Islands
Special purpose	1020
Public service	365
Tourism	73
Agriculture	340
Transportation	49
Renewable resource and urban-rural construction	80
Total	1927

Source: Translated from the State Oceanic Administration People's Republic of China (2012)

Many of the uninhabited islands are well preserved with little human intervention. Since 1985, China has switched its focus on islands from the simple utilization of marine biological resources to non-living resources and space resources. However, the ownership of the uninhabited islands has not been explicitly stipulated in the Chinese legislative system causing random development, occupation, waste, and destruction (Chen et al., 2004). Some of the uninhabited islands became unclaimed land occupied by nearby

fishermen. Since they built simple shelters on the islands for brief stops, inevitably, undecomposed litter was found everywhere, such as plastic bags, bottles, and construction materials. Uninhabited islands' surrounding areas were also illegally occupied for aquaculture. Moreover, what is worse, exploration for the purpose of theft has destroyed island ecosystems causing countless disappearances of uninhabited islands. For example, from 1992 to 2006, a 0.1km^2 uninhabited island called Qiaoliangshan Island was leased to a quarrying company at the annual fee of US$400. However, there is very little left of this tiny island after a few years' exploitation because almost all the rocks from the island have been quarried and sold to Shanghai as reclamation material (Translated from Zheng, 2011). Soil, plants, and even terrain have been ruined. Consequently, soil erosion, low productivity in the plant community, and an increasingly sensitive ecosystem are now common features on the island. Currently, this uninhabited island is still in the process of ecological restoration.

There were some attempts tourism development at uninhabited island before the issue of the Chinese Island Protection Law, but the outcomes of this activity has been overwhelmingly negative (Table 9) (Translated from Wang et al., 2011). Some of the uninhabited islands' entire ecosystems and marine resources have been ruined, which significantly affects further utilization and protection.

Table 9 *Examples of Previous Attempts of Tourism Development in Chinese Uninhabited Islands*

Province	**Island Name**	**Owner**	**Development Problem**
Hebei Province	Shi Jiu Tuo (1985)	Government	1. Overloaded on island environment 2. Lack of effective management on island sustainability
Zhejiang Province	Da Zhu Yu (1996)	Hu Yu Marine Ecological Resources Development Co., Ltd	1. Five years development agreement that is too short for island development 2. Natural Disasters 3. Local government shared the gate income
Fujian Province	Huo Shao Yu (1996)	Xiamen Road & Bridge Group	1. Traffic inconvenience 2. Limited attraction because of small land area (0.27km^2) 3. Pollution from tourism waste

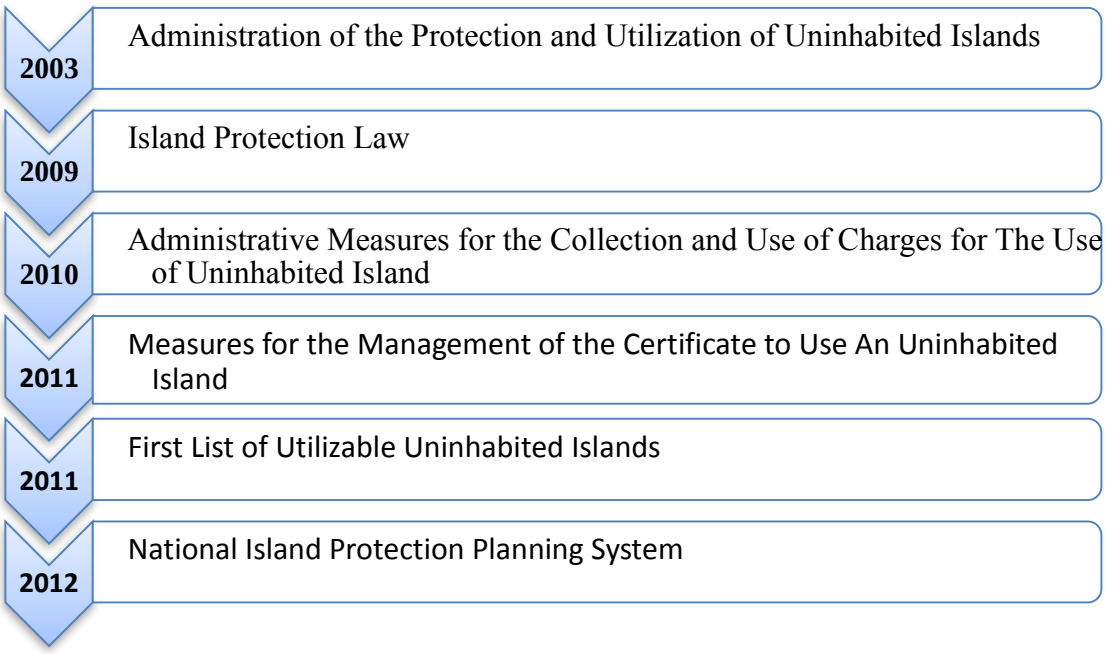
Source: Translated from Wang et al. (2011)

Similar to urbanization, uninhabited islands are gradually being invaded by the needs of human beings, a situation these places share with the rapid pace of development in the rest of China. Economic reform has led China to become the second largest economy in the world, but the problem left to the public is the polluted environment. Chinese industrial movement from coastal provinces to central provinces and even other developing countries, shows the increasing pressure of resources and pollution of the environment. Therefore, if the current trends of development continue unabated, all unspoiled areas, particularly uninhabited islands, are likely to be caught in the collapse.

Chinese Legislation System of Uninhabited Islands

In recent years, great shifts have happened in standardizing uninhabited islands' utilization and protection, as well as establishing some instructional principles for inhabited islands. For the purpose of both protecting uninhabited islands, the relevant legislation system could be classified as national and local. Specific uninhabited islands' legislation system started at 2004 with gradual improvement until the present (Figure 7).

Figure 7. Milestones of the Island Legislative System in China.



Source: Translated from China Islands, retrieved May 1st 2015

In 2003, the State Oceanic Administration of People's Republic of China (SOA), Ministry of Civil Affairs of the People's Republic of China (MCA), and China People's Liberation Army General Political Department (GDP) issued an administrative regulation, 'Administration of the Protection and Utilization of Uninhabited Islands'. Since then, uninhabited islands were given an official definition; "uninhabited islands are those islands, rocks, and low-tide elevations, which do not serve as permanent household residence" Translated from the State Oceanic Administration of People's Republic of China, Ministry of Civil Affairs of the People's Republic of China & China People's Liberation Army General Political Department (2003)

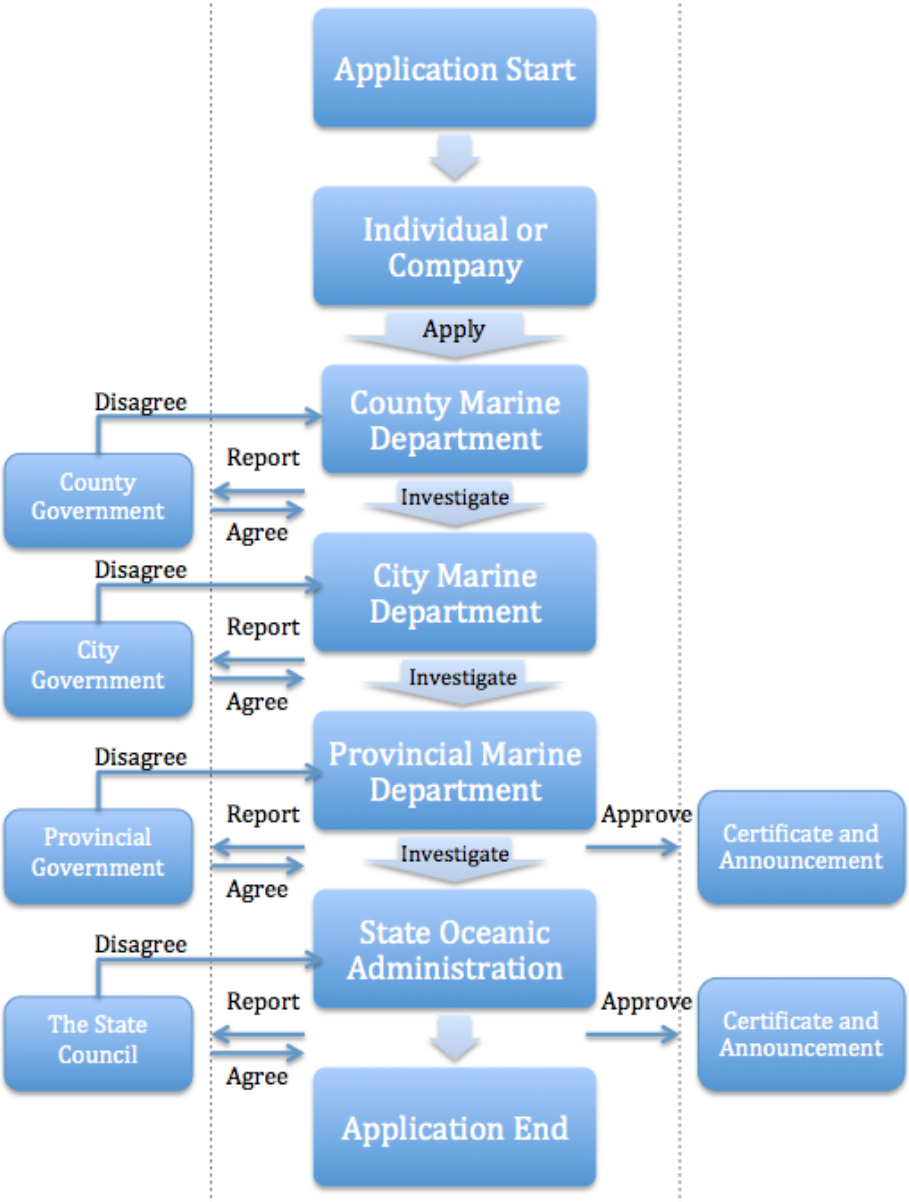
For the purpose of strengthening uninhabited islands' protection and utilization, this regulation was the first one that allowed individuals or companies to utilize uninhabited islands responsibly for a maximum of 50 years. What is specifically mentioned in the regulation is that land reclamation, dredging, bombing islands and connecting islands with concrete dams are not allowed.

After that, some coastal cities have enacted their uninhabited island protection regulations such as the uninhabited island management regulation in Ningbo, Xiamen City, and Zhejiang Province. In 2009, the first specific law about island protection and utilization, the 'Island Protection Law of the People's Republic of China', was implemented, which started a legal way to standardize island development (Zhang, 2012). The law classified islands into inhabited islands and uninhabited islands while the law solely emphasizes environmental protection on uninhabited islands (You & Huang, 2010). This island protection law represented a great shift in Chinese legal history, establishing many basic rules for island development.

Some obvious shifts in this law include various aspects. First, it establishes four guiding principles for island protection and utilization that is 'Scientific planning, priority of protection, reasonable exploitation, and sustainable utilization'. Second, it clarifies that uninhabited islands are owned by the State, and the right of ownership shall be exercised by the State Council on behalf of the State. Third, it appoints Oceanic Administrative Department of the State Council on administering the protection, development, and utilization of uninhabited islands throughout the country. Fourth, it encourages the prior usage of wind energy, ocean energy, solar energy and other renewable energy as well as rainwater harvesting, seawater desalination, sewage recycling and other technologies.

Last but not the least, it set up the procedure on the examination and approval of uninhabited islands utilization as Figure 8.

Figure 8. Application Process for Uninhabited Island Utilization.



Source: Translated from China Island, retrieved May 1st 2015

In 2010, the report "Administrative Measures for the Collection and Use of Charges for Uninhabited Island" was issued by the SOA. According to this regulation, China is running a system of compensated use of uninhabited islands and the minimum price for leasing an uninhabited island is given in the following formula. Ecological compensation will be added to the price according to the experts' EIA report.

Minimum Price = Area[1] * Useful Life * Lowest Price Standard[2]

Translated from Ministry of Finance of the People's Republic of China & State Oceanic Administration People's Republic of China (2010)

In 2011, a further report entitled, "Measures for the Management of the Certificate to Use an Uninhabited Island" was issued by SOA standardizing the issuing and management of the uninhabited island usage certificate.

The same year, for the purpose of further promoting the development of uninhabited islands in China, the State Oceanic Administration released the first list of Chinese usable uninhabited islands involving eight provinces and 176 islands in total (Table 11). These listed uninhabited islands can be used for tourism, entertainment, transportation, industrial production, storage, fisheries, agriculture, forestry, recycling energy, and public service purpose (Table 10). So far there are ten uninhabited islands on the list that have been certified for a private owner to develop (Table 12).

[1] Area of the uninhabited island depends on the government's official measurement of the island's exact area of development and utilization.

[2] The lowest price standard of the uninhabited island is decided by the uninhabited island's grade, island development type and distance to coastline.

Table 10 *Purpose and Related Number of Usable Uninhabited Islands in China*

Purpose of Uninhabited Islands Development	**Number**
Tourism and Entertainment	111
Transportation and Industry	21
Transportation	28
Industrial Production	16
Fishery	9
Public Service	6
Agriculture and Fishery	3
Urban and Rural Development	3
Science	2
Industrial Construction	1
Bridge	1
Storage	1

Source: Translated from China Island, retrieved May 1st 2015

Table 11 *Number of Utilizable Uninhabited Islands in Different Provinces in China*

Province	Number of Utilizable Uninhabited Island
Liaoning	11
Shandong	5
Jiangsu	2
Zhejiang	31
Fujian	50
Guangdong	60
Guangxi	11
Hainan	6

Source: Translated from The Central People's Government of the People's Republic of China Official Website, retrieved May 1st 2015

Table 12 *Certified Uninhabited Islands*

Province	Uninhabited Island	Area(km2)	Purpose	Plan
Fujian	Xiao Sui Yu (2012)	0.0812	Transportation	Port terminal construction
Fujian	Yang Yu (2011）	0.2251	Tourism and Entertainment	Marine farm and tourism attraction
Fujian	JianYu (2011)	0.015139	Tourism and Entertainment	Tourism attraction

Zhejiang	Danmenshan Island (2011)	1.018	Tourism and Entertainment	Tourism attraction
Zhejiang	DayangYu (2011)	0.2528	Tourism and Entertainment	Tourism attraction
Guangdong	Xiao San Zhou (2011)	0.0075	Tourism and Entertainment	Tourism attraction
Guangdong	Da San Zhou (2011)	0.0109	Tourism and Entertainment	Tourism attraction
Guangxi	DaErMei Ling (2011)	0.039468	Tourism and Transportation	Cross-sea bridge construction
Hainan	Dongluo Island (2011)	0.1316	Tourism and Entertainment	Tourism attraction
Shandong	Taohua Island (2013)	0.35	Tourism and Entertainment	Tourism attraction

Source: Translated from China Island, retrieved May 1st 2015

In 2012, the "National Island Protection Planning System" was issued by SOA. It identified the guidelines, basic principles, aims, and primary missions of island protection in China, and is the programming document for Chinese island development. Islands' resources and their related developing plans are listed below and sorted by different sea area in China (Table 13).

Table 13 *List of Chinese Island Resources Sorted by Different Sea Area*

rea	**Number of Inhabited Islands**	**Number of Uninhabited Islands**	**Resources**
The Yellow Sea and The Bohai Sea			
Changshan Islands and East Liaoning Province	28	166	Fishery Tourism
Bohai Sea	8	263	Fishery Tourism Harbour Brine
Miaodao Islands	10	22	Fishery Tidal Power Ecotourism
Shandong Province	20	190	Fishery Tourism
Jiangsu Province	4	11	Tidal Flat Aquatic Resource Harbour Tourism
East China Sea			

Yangtze River Estuary and Hangzhou Bay	4	70	Harbor Ecotourism
Zhoushan Islands	139	1119	Tourism Fishery Deep-water Coastline
Zhejiang Province	99	1460	Marine Biological Resources Tourism
Fujian Province	101	1273	Fishery Tourism Harbour Oceanic Energy
South China Sea			
Eastern Guangdong Province	12	310	Rare Species Fishery Tourism Deep-water coastline
Pearl River Estuary	14	171	Harbour
Western Guangdong Province	18	234	Forest Harbour Tourism
Beibu Gulf	11	640	Harbor Tourism Marine Biological Resources

Hainan Islands	12	169	Mangrove Coral Reef Sea Grass Bed Tropical Monsoon Forest Tourism
Paracel Islands	0	30	Tourism Biological Resources

Source: Translated from State Oceanic Administration People's Republic of China (2012)

The planning period for this system is ten years from 2011 to 2020 and applies to all the islands belonging to China. In the Island Protection Planning System, fundamental principles for island development are as follows:

1. Scientific planning and protection priority.
2. Overall consideration and classification management.
3. Safeguard country's right and interests.
4. Innovative development.
5. Comprehensive progress and critical breakthroughs.

Source: Translated from State Oceanic Administration People's Republic of China (2012)

Islands are classified into different classes oriented by their utilization purpose as follows:

1. Islands for a special purpose. This concept including islands as territorial seabases, natural reserves, and military areas. Inhabited island's special purpose areas are included. No one can exploit these special purpose islands without authorization.

2. Inhabited islands. The protection of inhabited islands including island beaches, vegetation, fresh water, rare animals and plants and their habitats.

3. Uninhabited islands. The principle for uninhabited islands development in China is "Conservation priority with optimum utilization" which can be classified into different patterns of utilization. For the purpose of tourism, ecotourism is advocated for uninhabited islands' development. Island tourism capacity should be set up to limit exploitation of the island. Energy saving technology is encouraged during development.

Source: Translated from State Oceanic Administration People's Republic of China (2012)

Additionally, the "National Island Protection Planning System" also gives protection guidelines to islands located in different regions according to their environmental features and current situations.

Study Significance

The significance of this research can be shown in mindfulness, theory, and application. Mentally, the present research provides the opportunity to emphasize the study of uninhabited islands and their significant effects on our planet. Although the result may not provide direct services from which people can benefit, their indirect and ethical

effects on human beings cannot be neglected. It is vital to keep ecosystem services in mind during development studies because the "lonely planet" we are living on is a complicated organic entity.

Theoretically, this research can fill the present research vacuum regarding the sustainable development of uninhabited islands. Even though there has been much research done on small island sustainability, there has been little consideration given to the study of island, which are not populated by humans, that is to say, uninhabited islands. The small involvement of uninhabited islands in international economic and political development has resulted in an absence in the literature about the valuable ecosystem services provided by them.

In application, with the global resource exploitation, uninhabited islands are under the spotlight on domestic and international stages. All kinds of development and protection plans have been carried out to transform uninhabited islands into "environmentally friendly" income generators. However, the future of uninhabited islands under this kind of utilizing-protection mode is still unknown, and some scholars have predicted that small islands are "sinking" due to the growing pressure of excessive exploitation, which is a localized example of the environmental degradation of the Earth (Martin, et al, 2015; Pelling & Uitto, 2001). Uninhabited islands' fragile ecosystems require sustainable strategies during the whole development process to better protect what is arguably the last pure land of the world. Our understanding of the Chinese uninhabited islands management is analogous to understanding the opportunities and challenges that other regions' uninhabited islands are facing. Only after fully understanding most of the consequences that may be caused by human activities can uninhabited island development

be sustainable. Additionally, this research will offer certain suggestions on uninhabited islands' utilization and protection by suggesting some sustainable development strategies.

Thesis Outline

This thesis describes the importance of uninhabited islands and the growing concerns about them. By studying the Chinese uninhabited island legislation system and Fangji Island's tourism development, this research presents a set of challenges and unintended consequences they are confronting. Chapter One provides the facts that originally interested me in researching uninhabited islands. With the growing interest in uninhabited islands all around the world, the present research provides the opportunity to concentrate on the uninhabited islands and their unique ecosystem services, complementing the lack of relevant research in literature. The methodology of this research is presented in Chapter Two with an articulation of the research paradigm, the rationale for why the case was chosen and its shortcomings. The literature review in Chapter Three provides a general background of the research including island studies, ecosystem services studies, and tourism sustainability. Chapter Four provides the overall situation of the case and Chapter Five is the analysis of the case study. The last two chapters discuss and conclude the research findings, followed by some sustainable development strategies for uninhabited islands.

Chapter Two: Research Methodology

Research Questions

Based on the study background and purposes mentioned at the end of the previous chapter, my research questions are:

1. Why are uninhabited islands important?
2. What are the opportunities and challenges associated with Chinese uninhabited islands' sustainability?
3. What is the ultimate purpose of the establishment of the uninhabited islands' legislation system?
4. Where will the current uninhabited islands development path lead?
5. Is it possible to find a balance between island ecosystem conservation and tourism development?

Research Paradigm

The primary object of this study is to examine the definition and importance of uninhabited islands, as well as the existing problems and possible impacts on Chinese uninhabited islands' sustainability under the relevant legislation system. It will be realized through a case study of the ten-year tourism development in Fangji Island by adapting the evaluation system pioneered by Ivandić and Telišman-Košuta (2012). A qualitative methodology is employed to collect data through in-depth archival research utilizing multiple sources of evidence.

For the purpose of collecting the most accurate and up-to-date information about Chinese uninhabited islands, this research is pursued in two steps: first by adapting in-depth archival research accomplished through a literature review with primary sources such as government publications and legislation, local official documents, and historical documents, as well as secondary sources including academic papers, scholarly journal articles, various thesis, conference papers, reports, and media; and second by conducting field research, where I visited and stayed in Fangji Island for three discontinuous weeks with the chance of accessing and observing primary information about the island.

This thesis is inter-disciplinary in nature, given the multi-faceted dimensions of the problems during the development of Chinese uninhabited islands with multiple sub-fields including international law, international relations, domestic public policy and public administration, marine environmental science, environmental politics, and geography. With the rich data from these various sub-fields, this research requires a better way to improve the validity of data collected. As a result, triangulation is also adopted in the research. Triangulation in case study research can result from a mixture of data, researchers, theories, and mixed methodological approaches, such as combined quantitative and qualitative research (Zivkovic, 2012).

Rationale for Case Chosen

A single-case study can be used to support or contest a model or theory, as well as to demonstrate an unusual or exemplary case (Yin, 1994). The type of research questions posed partially decide what research strategy should be employed (Yin, 2003). “The more that your questions seek to explain some present circumstance (e.g., “how” or “why” some

social phenomenon works), the more that case study research will be relevant (Yin, 2013, p.4). In this research, I chose to implement the case study strategy because it allows much detailed information to be collected. There are more than 6000 uninhabited islands in China, which is an enormous population that I am not able to investigate entirely. Instead, a case study of one uninhabited island may help to collect data of richer and greater depth than if a different research design was used. Additionally, the high similarities between the case that was chosen, and other uninhabited islands create the possibility of showing trends that can be applied to other uninhabited islands in China or other regions in the future.

This paper is an illustrative case study of Fangji Island, which examines the importance of uninhabited islands in China as well as their potential crises during social and economic development such as tourism, military, and infrastructure. Fangji Island was chosen as a study case because of its similarity and uniqueness. Fangji Island, which is primarily a tiny island without infrastructure, residences or electricity, shared some similarities with other unexploited islands including a fragile ecosystem, difficulties in development and remoteness.

Referring to the uniqueness of Fangji Island, its tourism development process occurred during the Chinese island legislation transition period, which fully showed the growing concern for uninhabited island management in China. At the beginning of the development of Fangji Island, no detailed or guiding document had been issued for the regulation of uninhabited island development. Consequently, the application and review process, when development began, were not as evolved as the current one especially in the area of environmental assessment. Before the issue of the ‘Island Protection Law’ in

2009, Fangji Island was exploited under the traditional pattern, without a considerate and comprehensive evaluation system. After 2009, national and provincial regulations on uninhabited island protection and utilization began to be released. Accordingly, any uninhabited islands utilization plans should be under the new regulation with no exception for Fangji Island. Getting through two different periods of island system reform and representing the remarkable progress of the Chinese island protection act, Fangji Island is a typical uninhabited island in Chinese island development history. Secondly, Fangji Island is a manageable place to study given its limited size. However, its emerging problems are symbolic of uninhabited island development in China, and this may be extended to represent global issues. Island Studies is an interdisciplinary subject area that requires systematic thinking. Even though this research focuses mainly on sustainable tourism, an integrated approach should be adopted in conducting the study of Fangji Island. Sustainable tourism has an extensive connection with the environment, biology, and geography, etc. Therefore, other related articles will be considered in the literature review as well.

Strengths and Weaknesses of the Research Design Methodology

There are some advantages of the research methodology that has been chosen. The study's research data covers both firsthand observation and secondary sources for the sake of analyzing the looming problem on Fangji Island and other uninhabited islands in China. The combination of firsthand observation and secondary sources could improve the accuracy and objectivity of the data collected. Additionally, given the fact that most of the scientific, academic and governmental documents were only written in Chinese, I have had to translate them into English so that readers can fully understand the overall situation

of uninhabited islands in China.

Even if the information collected and presented in this research is believed to be accurate and objective, weaknesses of the research design should be specified as well. One of the weaknesses may be that my translation from Chinese to English might not catch the nuances of the original sources. Secondly, this is quite a new topic in academia, so there is limited research on the topic. Thirdly, the poor education level of local workers on the island meant that it was difficult to hold formal interviews with them. Lastly, Fangji Island is operated by a private company. For this reason, business data is not shared with the public, and interviews with relevant government officials in local government were not conducted due to time and access constraints. However, I feel that the strengths of this research methodology outweigh its weaknesses.

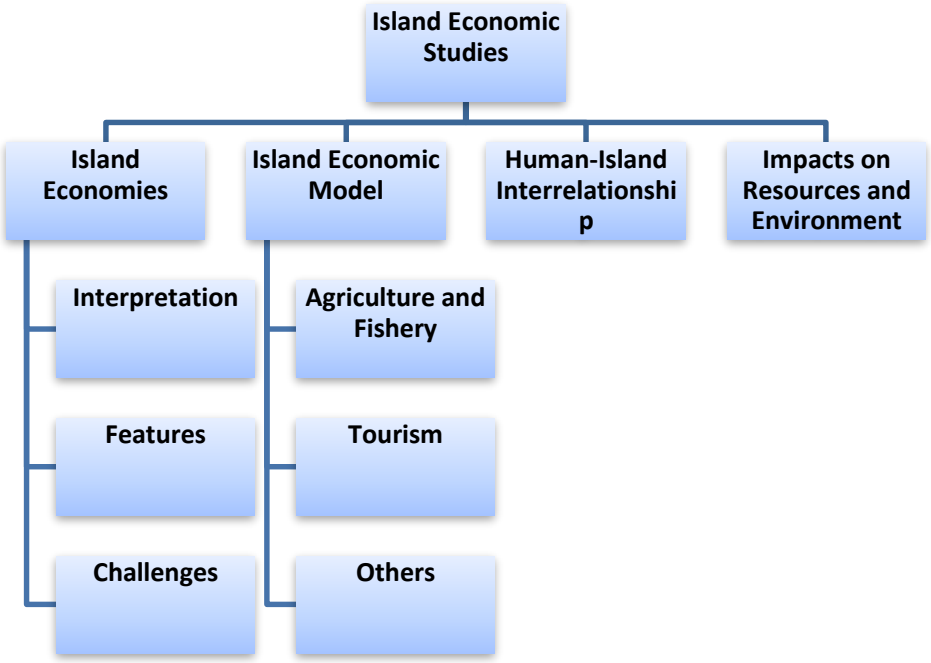
Chapter Three: Conceptual Framework

Island Economy Studies

Economics is a subfield of social science mainly studying the production, distribution and consumption of goods and services (Mansfield, 1974). All the subjects connect with each other sharing the same topic about earth's life. When discussing macroeconomics, natural capital cannot be neglected. Natural capital is equivalent to natural resources and natural services (Tani, 2014). Therefore, economic studies should come with the focus on the interrelationship between human activities and the natural environment.

Scholars from all around the world have done quite a lot of research on island economies focusing substantially on the following four aspects: island economies' interpretation, features, and challenges; island economies developing models; human-island interrelationships; and island development's impact on environment and resources. (Figure 9)

Figure 9. Brief Overview of Island Economic Studies Content.



Source: Author

Early pioneers identified the features of islands; small, poor, remote (Selwyn, 1978) and having other vulnerabilities (Briguglio, 1995). Small Island Developing States (SIDS) and territories share common problems represented by their unique insular ecosystems, high vulnerability to external change, and low but growing single-town centered populations (Douglas, 2006).

MIRAB formulation, the first island economy model, was formed by Bertram and Watters (1985). In this model, migration, remittances, financial aid and bureaucracy constitute the core of small island economies. Later, Baldacchino (2006) creatively included natural resources into the model as an important component in the economy system by articulating the PROFIT model (people, natural resources, overseas diplomacy, finance and transport). In the same year, McElroy's (2006) research suggested that Small

Island Tourist Economy (SITE) represents a special insular development case and an alternative to MIRAB.

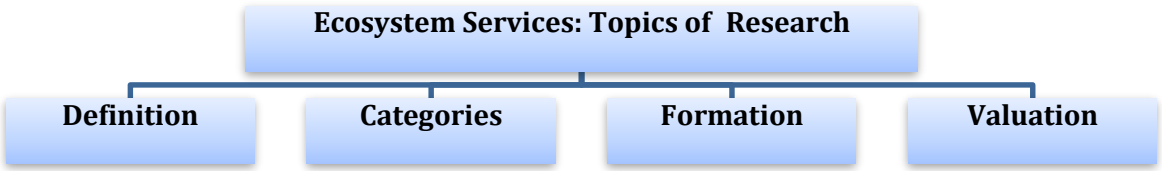
Most of the studies were established by island resources, environment, and society regarding small islands' sustainable development. Typical industries have been discussed such as fisheries (MceLroy, 1983; Siaosi, et al, 2012), agriculture (Dika, et al, 2011; Dressle & Pulhin, 2010; translated from Peng, et al, 2012). With the increasing number of inbound tourists, considerable research about the impact of tourism in small island economies has been published (McElroy & Hamma, 2010; Sharreef, 2003; Taylor, et al, 2009; Xing & Dangerfield, 2011). However, disasters (Baldacchino, 2010) and financial crises (Douglas, 2006) may have considerable effects on small island economies that require a flexible approach to achieve sustainability.

The human-Island interrelationship is a popular topic among island scholars who study the impact of economic development and human activities on island ecosystems including resources and the environment, such as island environmental capacity and the diversity of island species. Higgins-Desbiolles (2011) argued that environmental conservation would be slowly undermined as ecological interests are traded off in the interest of promoting economic development. Vignon and other scholars (Vignon, et al, 2010) studied the impact of shark feed tourism on Moorea Island. In De Albuquerque's (De Albuquerque & McElroy, 1992) research, the destination life-cycle model was introduced. As another example of this, Silva's (Silva & Madureira, 2012) research analyzed the impact of human activities on island mangrove ecosystem on Santa Catarina Island.

Ecosystem Services

Island ecosystems are increasingly influenced by human activities. The idea that ecosystems provide services to human beings has been discussed in environmental science since the 1970s (Wilson & Matthews, 1972) with deeper research since that time. Ecosystem services, by its name, is an object connecting ecology and society while the relevant research deals mainly with its definition, categories, formation, value and assessment (Figure 10).

Figure 10. Research Topics of Ecosystem Services.



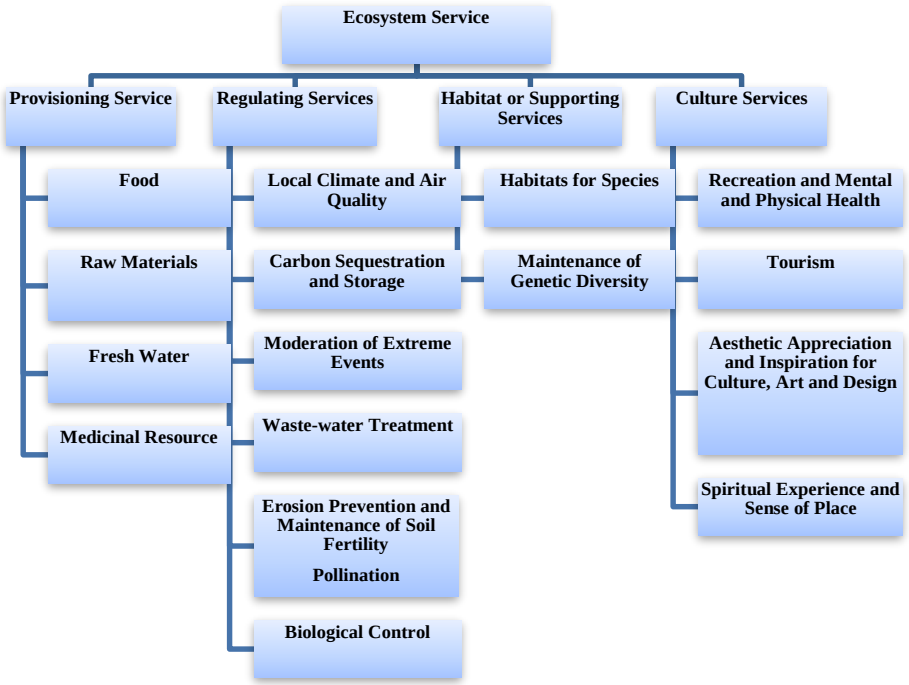
Source: Author

In 1977, Westman used social value to measure the worth of "nature's services" (Westman, 1977); while in 1997, Daily defined ecosystem services as "the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life" (Daily, 1997, p.3). However, the most prominent and widely accepted definition was given by the Millennium Ecosystem Assessment (MA). It characterized ecosystem services as "the benefits people obtain from ecosystems" (Millennium Ecosystem Assessment, 2005a). According to this definition, only if human beings obtain benefits from ecosystems, can the whole process then be defined as

"ecosystem services". However, the benefits that other living things obtain from the ecosystem should be emphasized as well because they are also integrated components in our planet. Jax (2010) gives gave a more general definition of ecosystem services that "those components and processes that are used, required, or demanded from ecological systems" can be defined as ecosystem services" (Jax, 2010, p.70).

Since the 1990s, a few pioneers have attempted to classify the categories of ecosystem services since the 1990s (Costanza, 1997; Daily, 1997; Moberg & Folke, 1999; Norberg, 1999). However, the most well-accepted one was given by the MA that classifies ecosystem services into provisioning services, regulating services, habitat or supporting services and culture services (Millennium Ecosystem Assessment, 2005a) (Figure 11).

Figure 11. Ecosystem Service Categories.



Source: Millennium Ecosystem Assessment (2005a)

Understanding the formation of ecosystems helps to understand the interrelationship among different components. During the formation of the ecosystem, biodiversity plays a significant role throughout the whole process. Quite a lot of research has been done regarding the linkage between biological diversity, ecosystem services and human well-being (Balvanera et al, 2006; Hainess-Young & Potschin, 2010; Mace et al, 2012). The conservation of ecosystem services for 2020 will still focus on the maintenance and improvement of biodiversity (Perrings et al, 2010).

The importance of biodiversity could be represented by its economic value. The value of biodiversity is where ecology and economy blend (Edwards & Abivardi, 1998) and is the only way that people understand the ecosystem service to humanity. The direct service of biodiversity is about the value derived from the actual use of a good or service, such as food, clothing, housing, medicine, and energy, while the indirect service delivered to us by a healthy ecosystem is about the input that helps others to produce something else that people use directly. For example, people cannot derive economic value directly from mangroves but they can enjoy the products and services provided by mangroves such as providing habitation for all kinds of organisms, protecting the coastline from wave action and erosion. Last but not the least, biodiversity has its aesthetic or ethical effect for a human being that is an essential service. The value of aesthetic services is priceless in terms of what we leave for the future. Lost biodiversity is something that we cannot bring back. We are the stewards of the ecosystem, and we are also a major influence on environmental quality and how ecosystems function. The ethical or aesthetic quality of the environment will decrease due to the increasing human activities such as pollution,

overfishing, and habitat destruction. This continuous reduction in biodiversity will result in the collapse of the ecosystem.

Research about the assessment of ecosystem services has been carried out for a long period with different aspects (Costanza et al, 1997; Perrings, 2000; Pimentel et al, 1997; Ninan et al, 2007; Turner et al, 2007). It is recognized that economic valuation of biodiversity and ecosystem services will help in evaluating their benefits and contribution to the economy and human being. Additionally, it may help decision-makers in weighing the trade-offs between conservation and development.

Sustainable Tourism

Over the last few decades, sustainable development has emerged as one of the most popular catchphrases and the debate on how to achieve sustainable development has become pervasive. A notable definition of sustainable development was given in the Brundtland report, where sustainable development was defined as

> Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs. (World Commission on Environment and Development, 1987, p54).

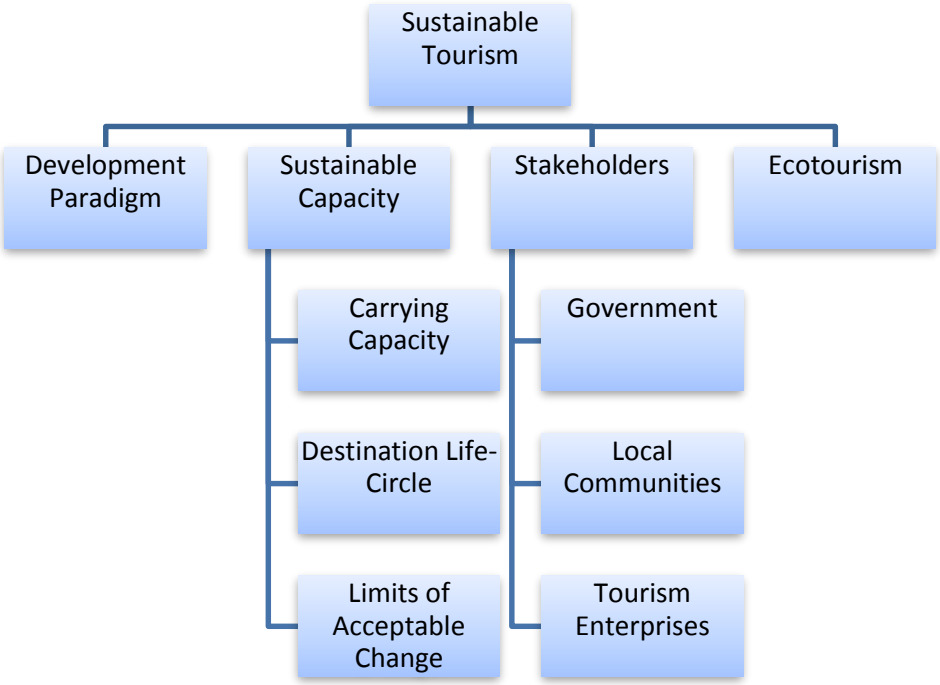
Regardless of the criticisms of the definition of sustainable development provided in this seminal report, it has been widely accepted and endorsed by governments and other organizations worldwide. Gladwin (Gladwin, et al., 1995) argued that the meaning of sustainable development will go on, and should go on, for a long time, and any chosen conception is but one of many that might be offered at this time.

With the rapid development of the tourism industry, considerable profits to the local economy have been earned. As well, a great variety of resources and environmental issues have arisen; hence, people have become increasingly aware of the adverse socio-cultural and environmental impacts of undisciplined mass tourism. Moreover, alternative forms of mass tourism have been promoted such as cultural tourism, wildlife watching tourism and adventure tourism, but they are not always sustainable economically, environmentally or socially. Generally speaking, a comprehensive assessment of the positive economic contribution of tourism development to a particular destination area must include the direct, indirect and induced economic impacts (García-Falcón, 1999). In certain situations, sustainable development has been discussed in different professional areas for a long time.

Sustainable tourism can be defined as "tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of the visitors, the industry, the environment and host communities" (World Tourism Organization & United Nations Environment Programme, 2005). Even before this official definition was released, scholars have been debating this topic for decades. Hunter (1997) suggested that the dominant perception of sustainable tourism refers to a tourism/environment system in balance at destination areas. Hughes (1995) thought

sustainable tourism has eclipsed the emergence of an ethical response. consequently, considerable research connecting sustainable tourism and ethical responses have been carried out (Lansing & Vries, 2007). According to the variety of research topics, sustainable tourism research could be classified into four aspects, which are development paradigm, sustainable capacity, stakeholders, and ecotourism (Figure 12).

Figure 12. Brief Overview of Sustainable Tourism Studies Content.



Source: Author

Referring to the development paradigm, it is the interrelation between tourism and environment. Cater (1995) identified four paradigms between tourism and environment, which were win/win, win/lose, lose/win and lose/lose. Similarly, Hunter (1997) pointed out four common paradigms, which were environmental priority, tourism under environmental protection, environmental protection under tourism and environmental

protection priority. However, Johnson & Tyrrell (2005) created a dynamic model demonstrating that there is no single universal sustainable optimum, and a policy that maintains overly pristine environmental quality may be just as unsustainable.

It is widely accepted that sustainable capacity is crucial to sociocultural and environmental protection. Sustainable capacity is a dynamic concept that varies from circumstance to circumstance due to its extensive determinant. Cooper (Cooper, et al., 1998) thought that carrying capacity could only be examined in a case-by-case fashion because it is sensitive to location, the type of tourist activity, the difference in cultures between tourists and guests, the speed of tourism growth and the temporal dimension of development. Also, Castellani & Sala (2012) used the Ecology Footprint method and Life Cycle Assessment to analyze tourism sustainability and the correlation between these two methods. The environmental factors that intersect and result in water and energy inequity are already causing environmental problems and unsustainable capacity. at some point, these inequities will have harmful effects on island tourism and its economy since water and energy availability on many islands is reaching a crisis point. The sustainability of tourism is dependent on an adequate water and energy supply of sufficient quality and quantity. Therefore, quite a few types of research on the significance of water and energy supply in tourism development have been carried out.

Tourism Sustainability is a dynamic mechanism that requires efforts from the government, residents, and tourism enterprises. McIntyre (1993) suggests interaction and cooperation between public authorities, community residents, tourism industry operators and environmental protectors for tourism sustainability. Forsyth (1997) indicates that environmental practices may lead to commercial advantages if adopted proactively rather

than in response to market demand for an ethical or 'green' product. More and more research has been carried out among local communities in tourism destinations because they are the direct participators and experiencers of tourism activities. Thus, government and organizations may also contribute to sustainable tourism development through administration behavior, fiscal policy and tourism planning (Connell 2009, Bramwell 2011, Yasarata 2010).

The most popular current topic about sustainable tourism is ecotourism. The emergence of ecotourism can be dated back to 1980s. The first definition of ecotourism was made by the Mexican architect Héctor Ceballos-Lascuráin:

> Traveling to relatively undisturbed or uncontaminated natural areas with the specific objective of studying, admiring, and enjoying the scenery and its wild plants and animals, as well as any existing cultural manifestation (both the past and present) found in these areas… (Ceballos-Lascurain, 1987, cited in Boo, 1990, p. xiv).

Following this, scholars continue to improve ecotourism studies:

> Low impact nature tourism which contributes to the maintenance of species and habitats either directly through a contribution to conservation and/or indirectly by providing revenue to the local community sufficient for local people to value, and therefore protect, their wildlife heritage area as a source of income (Goodwin, 1996, p. 288).

The definition of ecotourism given by Goodwin (1996) has mentioned the low impact tourism activities and benefits for the local environment. In 2003, Fennell (2003) defined some main principles of ecotourism includes interest in nature, contribution to conservation, reliance on parks and protected areas, benefits for local people/long-term benefits, education and study, low impact/non-consumptive, ethics/responsibility, management, sustainable and small-scale. The definition provided by Fennell is

> Ecotourism is a sustainable form of natural resource-based tourism that focuses primarily on experiencing and learning about nature, and which is ethically managed to be low-impact, non-consumptive, and locally oriented (control, benefits, and scale). It typically occurs in natural areas, and should contribute to the conservation or preservation of such areas (Fennell, 2003, p. 43).

The debate on the definition of ecotourism has continued for many years. Based on the previous research on ecotourism, some scholars have improved the definition of ecotourism. For example, Burneika & Kriaučiūnas (2007) have emphasized the development of ecological consciousness in ecotourism. Another example showing the improvement on the research of ecotourism definition is provided by The International Ecotourism Society. The earliest definition of ecotourism offered by The International Ecotourism Society is "Responsible travel to natural areas that conserves the environment and improves the well-being of local people" (The International Ecotourism Society, 1990). Compared to the 1990's definition, the latest one, revised in 2015, eliminates ambiguity with small modification and additions, and, therefore, reduces misinterpretations within the tourism industry. The above definition included only two of the three pillars of ecotourism, 'Conservation' and 'Local Communities'. Another

important pillar is ‘Interpretation or Education’ because creating an ecological conscience is one of the three essential principles of ecotourism (The International Ecotourism Society, 2015).

Chapter Four: Case Study

Often described as a desert island, Fangji Island does live up to this image. Abundant coral colonies with a rich variety of marine fauna and precipitous cliffs fringe the island. Tourism to the island started with the introduction of uninhabited island protection and utilization regulations in 2003. The tourism activities on the island range from forest hiking, rock viewing, and traditional temple visits, to deep-sea fishing, diving, rock fishing, and other water sports. The island's unique location, limited size, and fragile ecosystem make it representative of islands with similar contrived and natural hazards (Table 14). Therefore, the island's tourism should be organized properly between tourism promotion and environmental conservation with no exception made for Fangji Island's development history.

Table 14 *Vulnerability and Hazards for Small Islands*

Vulnerability and Hazards for Small Islands	Geographical isolation
	Insularity and remoteness
	Small size of islands and population pressure
	Communication and transport
	Environmental vulnerability
	Ecosystem vulnerability
	Poor infrastructure
	Scarcity of drinking water
	Sanitation

	Solid waste disposal
	Energy requirement
	Storms
	Sea level rise
	Oil spills
	Marine pollution

Source: Pelling & Uitto (2001)

Uninhabited island protection and utilization are sustainable strategies based on natural, economic and social features of islands. It is an obvious fact that tourism depends heavily on well preserved natural and socio-cultural environments of the destinations, so these need to be fully investigated before development. Fangji Island's evaluation will be carried out according to the model created by Ivandić & Telišman-Košuta (2012) as follows:

Spatial and Ecological Evaluations

Spatial and ecological evaluations mainly focus on an island destination's carrying capacity.

Location Characteristics

Location characteristics are evaluated according to the quality of the natural features of the island itself and the quality of its surroundings.

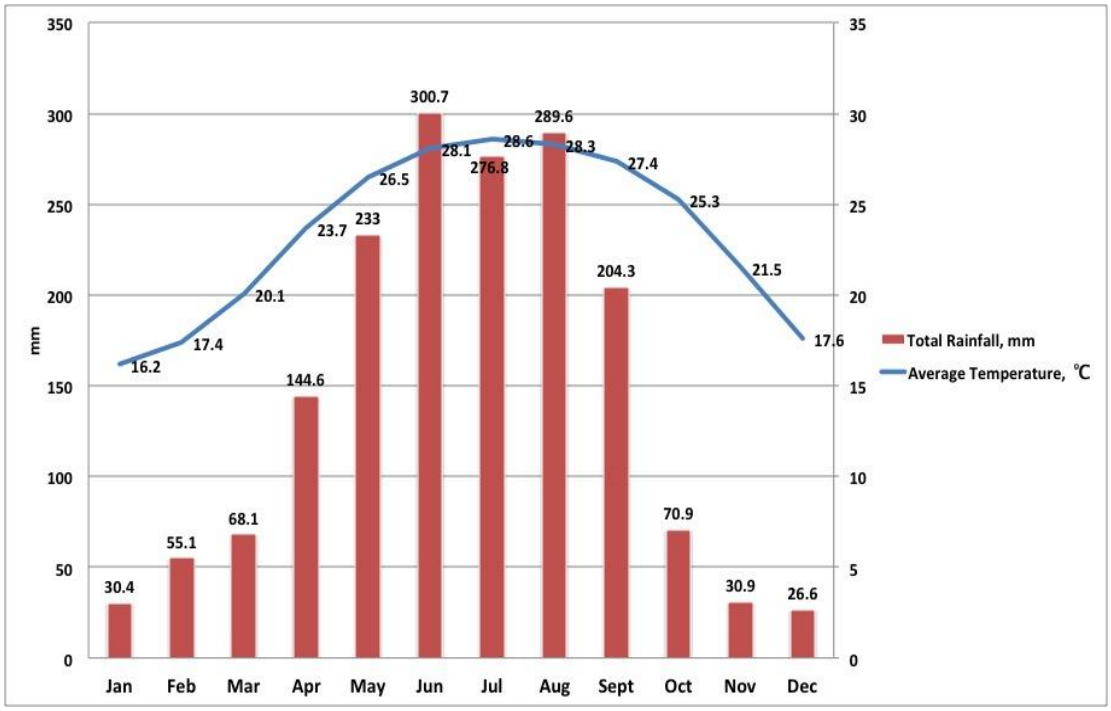
History:

The English translation of Fangji is chicken, which originally came from a Chinese fairy tale. The first name of this island was Gulf Island. It is situated on the only route to some important sea areas, including fishing grounds. Therefore, fishing boats must pass it by before going fishing. However, fishing vessels regularly sank around the island due to its particularly turbulent waves. This problem was not solved until a monk came to these villages. He found that the waves that occurred around the island were similar to centipedes attacking the passing boats. The monk suggested that the fishermen build a temple to worship Mazu and breed chickens on the island because of the adversarial relationship between chickens and centipedes. Since then, it is said that the waves around the island have become calmer, and the fishermen obtained richer harvests. As a consequence, and because they believed it would protect their families, the name of the island was changed to Chicken Island.

Climate Quality:

Fangji Island is located in the subtropics where the temperature ranges from 15 to 30 degrees centigrade (Figure 13). Mild temperatures with sunshine, fresh air, clean beaches and an isolated environment contribute to Fangji Island's status as a vacationland.

Figure 13. Maoming City Annual Climate Data.



Source: Translated from Guangdong Meteorological Service (2013)

Sea Quality:

The depth of coastal water in the north ranges from 1.3 meters to 2.0 meters and in the southeast ranges from 2.6 meters to 10 meters. In the Fangji Island area, underwater visibility is around 8 meters (translated from Chen, et al., 2004).

Location:

Located on a corridor connecting Hong Kong, Macau, Pearl River Delta Area and Hainan Province, Fangji Island has several advantages as a transportation resource. With the improvement of the Chinese economy and people's living standards, yachting has been

gradually growing as a luxury, leisure activity. Some high-income people have already bought yachts for leisure. The yacht industry is considered to be "an opportunity floating on the golden waterway;" a promising project that is predicted to be flourishing in the near future. Fangji Island's unique location make it a perfect docking station for yachts on the South China Sea.

Beach Quality:

Fangji Island has beach resources as well. The sand on the northwest shore is white and soft, which is good for beach swimming and other water sports. The total beach area is relatively small on Fangji Island (translated from Chen, et al., 2004).

Terrain Quality:

Fangji Island, the largest island in Maoming, carries a small hill with the highest point of 122 meters. Fangji Island was formed of rocks that have weathered out into northeast-southwest ridges with about a fifteen-degree slope all around.

Four types of landscape can be seen on Fangji Island including low erosion denuded hills, alluvial terraces, beaches and rock beaches. Since Fangji Island was strongly affected by coastal dynamic processes such as erosion and weathering effects, wavy-erosion platforms, cliffs, marine cave and the marine stack can be seen everywhere on the island. A cliff lies to the east, and the biggest marine stack lies on the edge of the northeast side in the shape of cockscomb, which perfectly matches the history of the island's name (translated from Chen, et al., 2004).

Attractiveness of Natural and Anthropogenic Resources On the Island:

Wildlife resources on Fangji Island are abundant with a high tourism value. Before being developed, Fangji Island preserved intact, old-growth forest covering more than 95% of the island area including 101 families and 275 species such as dragon dracaena, Amur grape vine, wild banana and cactus (translated from Chen, et al., 2004). After development, Fangji Island remains about 80% forest. Fangji Island is a habitat for many birds including purple and white magpies, kingfisher, egret, crane, mynah, and owl. Deer and wild ox can also be seen. The undersea resources are abundant as well with species such as lobster, abalone, starfish and sea urchin. It is notable that a national lancelets protection area is located close to Fangji Island.

The undersea world is the most attractive resource in Fangji Island. The Ocean and Fishery Bureau in Maoming City, Guangdong Province promotes sustainable development in the fisheries industry. In the first half of 2013, 5.21 billion Yuan were produced in the fisheries sector in this area. As for the Fangji Island area, on the basis of its completion of artificial reefs off the coast, 12 million Yuan has been fully funded to build new artificial reefs with a total area of 23,400m^2. From previous research, the dominant fish species in Fangji Island Sea Area are as follows in Table 15 and fully show the abundance of wildlife resources around Fangji Island Sea area:

.

Table 15 *Common Commercial Fish in Fangji Island's Sea Area*

Common Commercial Fishes in Fangji Island Sea Area		
Pilchards	Clupanodon puctatus	Ilsha elongate
stolepHorus commersoni	StolepHorus chinenesis	Thrissa kammalensis
Setipinna taty	Coilia grayii	Harpodon nehereus
Muraenesox cinereus	Mugil cepHalus Linnaeus	Osteo mugil opHuyseni
Liza carinatus	Eleutheronema tetradactylus	Polynemus sextarus
EpinepHelus akaara	EpinepHelus fario	Caranx malabaricus
Carangoides (Atule) kalla	Decapterus maruadsi	Megalapis cordyla
Trachurus japonicas	Formio niger	Johnius belengeri
Wak sina	Otalithes argenteus	Nibea albiflora
Argyrosomus macrocepHalus	Argyrosomus argentatus	Pseudosciaena crocea
Collichthys lucidus	Leiognathus bindus	Leignathus brevirostris
Parargyrops edita Tanaka	Rhabdosargus sarba	Sparus macroceHalus
Gymnocranius griseus	Nemipterus japonicas	Nemipterus virgatus
Priacanthus tarenus	Priacanthus macracanthus	Saurida tumbil
Pamadasys hasta	Upeneus bensasi	Upeneus sulpHureus
Siganus oramin	Siganus fuscescens	Euplerogrammus muticus
Lepturacanthus savala	Trichiurus haumela	Scombe rmorus commersoni

Scombe rmorus guttatus	EpHippus orbis	Pampus chinensis
Pampus nozawae	Pampus argenteus	Psenopsis anomala
Psenopsis indicus	Chaeturichthys stigmatias	Odibtanbktopus rubicundus
Trypauchen vagina	Cynoglossus macrolepidotus	Cynoglossus lineolatus
Cynoglossus semilaevis		

Source: Chen (2006)

Tourists say that coral, sago cycads, and colorful damselfish, together with beautifully shaped rocks, make it the best location for scuba diving in Guangdong Province. According to research from Guangdong Marine University, 38 kinds of seabed creatures have been found (Table 16). Because of that, Fangji Island offers the largest diving base in China.

Table 16 *Benthos in Fangji Island's Sea Area*

Benthos in Fangji Island Sea Area	
Cavernularia sp.	Cirriformia sp.
Ophelina acuminaia	Glycera chirori
Chloeia parva	Arenicola sp.
Dentalium sp.	Rapana bezoar
Murex trapa	Clavatuta pseudopriciplis
Gemmula deshayesii	Turricula nelliae spurius
Brachytoma flavidulus	Turricula javana

Lophiotoma eucotropis	Turritella terebra
Olive mustellina	Potiarca pilula
Alypheus sp.	Parapenaeus fissuroides
Metapenaeus ensis	Penaeus japonicas
Pagurus sp.	Portunus sanguinolentus
Charybdis vadorum	Charybdis variegate
Charybdis feriatus	Eucrate crenata
Oratosquilla oratoria	Amphiura sp.
Arachnoides sp.	Phyllophorus sp.
Trachinocephalus myopus	Parachaeturichthys polynema
Calliurichthys dorysus	Tarphops oligolepis
Hypodytes indicus	Gymnothorax reticularis
Techypleus tridentatus	

Source: Lin & Feng (2008)

Attractiveness of Views from the Island:

The most important tourism attraction on Fangji Island is its beautiful scenery. There are five main scenic spots on the island. The northeast side of the island is rocky and hilly because of long time erosion by wind and waves. Rocks have been shaped into different figures making it the best place for rock fishing and watching the sunrise. Golden Beach is the largest scenic spot on Fangji Island and it includes a water activities area, a nightclub, a five-dimension cinema, Karaoke and a food court. The seashore recreational activities in Fangji Island are swimming, boating, fishing, diving, surfing, and snorkeling.

All the water activity facilities are available for rent on the island. Wild Pineapple Garden is an ecological theme park with many wild pineapple trees, which is a common tree species that grows in coastal forests and is useful for windbreaks and robust consolidation. Some observation decks in this garden offer the best locations for photographers. Wishing Tree and Tianhou Temple are places that allow people to make wishes regarding their future. With help and investment from other adherents, Tianhou Temple has been set up on Fangji Island. Folk customs and culture festival are supposed to be held in the temple regularly.

Land Availability

Land availability is evaluated according to the total usable surface area of the island and its possible physical capacity.

Facilities on the Island:

Before exploitation, Fangji Island was an uninhabited island without any permanent residents. The only facility that had been built on the island before development was a lighthouse. The lighthouse was constructed in 1937 on the top of Fangji Island with an illuminative distance of about 15 nautical miles to guide passing ships. This lighthouse is recharged by solar panels and operates 24 hours a day (translated from Chen, et al., 2004).

Accommodation Capacity:

As for accommodation, according to the Fangji Island official website (retrieved June 1st 2015), there is one motel, two hotels and more than a hundred chalets providing

approximately 750 beds in Fangji Island with prices ranging from US$50 to US$400 per night. Sea Motel is a wooden building with the base of a boat located right on the coast. Thirty-two rooms are available at the Sea Motel and include double rooms and king rooms. Bohe Harbour Hotel is located right next to the entertainment square with a restaurant on the first floor. Sixty rooms are available, and include double and king rooms. Ocean View Hotel is located behind the beach within a short distance to water sports. The ceiling of this hotel was painted in the color of the sky with stars, and is the first one in Guangdong Province. There are 100 rooms and 120 rooms in the Garden Villa and the Phoenix Chalet respectively. Considering the harmful effects of constructing a large-scale hotel on the island's massif and ecosystem, stilted houses have taken the place of the traditional house in Fangji Island. Houses built on sturdy stilts could allow people to live on the coast, enjoying frontline sea view and minimizing the impacts of insects and moisture. After the damage from Typhoon Hagupit in 2014, reinforced concrete structures were adopted to protect Fangji Island during monsoon season, where there are about five typhoons yearly.

Possibility of Altering Capacity:

Camping areas with public washrooms are available for rent on Fangji Island as well as camping equipment. Two conference rooms are available at the Ocean View Hotel, which can hold maximum 300 people at the same time.

During 2004 and 2010, there were only three restaurants on Fangji Island, which were all owned and operated by the Fangji Tourism Company. With the rapid growth of inbound tourists, more restaurants with diverse cuisine were needed. Therefore, investment from other companies was introduced. Right now there are seven different

types of restaurants and a food court on the island including a coffee shop, bar, BBQ area and seafood bar. Most of the food is bought from the mainland and sent to the island by ferry except some seafood. BBQ equipment is available for rent on Fangji Island.

Infrastructure Availability

Infrastructure availability is evaluated according to transport and utility infrastructures.

Traffic Accessibility to the Island:

Most island destinations are characterized by low accessibility. Solving the problem of accessibility decides an island destination's development value. There is a national highway connecting to Bohe harbor directly. The only way to Fangji Island is by boat. A harbour, 40 meters high and 5 meters wide, has been built in Fangji Island and four ferries with a 200-person capacity run six daily round trips between Bohe Harbor and Fangji Island during peak season while there are five trips per day during winter. Twelve speedboats are all ready for extra tourists during peak season. In the case of a destructive typhoon, a shelter has been built.

Traffic Accessibility within the Island:

On the island, a 10km island ring road around the island has been constructed connecting each scenic spot and entertainment area. During peak season, tour buses are available to transport tourists between different zones. Only electric motorcycles and electric golf carts are available for rent on the island, suitable for 2 to 8 people.

Availability, Capacity and Quality of the Utility System In Island:

There are three main forms of water that help to solve the water problem on Fangji Island: surface water, well water and imported water. Surface water is water on the surface of the planet such as a stream, river, lake, wetland or ocean. On Fangji Island, there is no river or wetland. The only small stream cannot provide enough water for construction and tourism. Therefore, rainfall becomes the primary source of fresh water. Fangji Island is located in a Monsoon Zone with plenty of rainfall yearly. Nine huge underground and surface reservoirs have been built at a cost of about $500,000 each. The biggest underground reservoir is right under the landmark Square of Fangji Island and is three stories high. Except for building reservoirs for storing fresh water, ditches were constructed around Fangji Island to funnel rainfall and stream water into reservoirs (translated from Peng & Tan, 2011).

All the reservoirs noted above are full during the spring to summer period. Nonetheless, this water is far from enough for construction and tourism. Well water is needed even though the cost is higher. Costing $170,000 for each "well", nobody can guarantee water will be found there. Even though the well has been set up, each one can only provide 20 tons of water per season. During peak season, water is in scarce supply, and therefore imported water from the mainland is required at a price of $5 per ton. This is six times more expensive than on the mainland because of high transport expenses. With this high cost for fresh water, seawater desalinization has been considered. However, the technology requires high-quality salinity control facilities, which may be more expensive than is practical (translated from Peng & Tan, 2011).

Electricity on Fangji Island is generated by diesel. There are five diesel generators with power ranging from 50W to 5000W. The high cost of energy constitutes an enormous

financial hurdle that will force operators to start considering other power generating facilities. It was reported that Fangji Island is in the process of consulting with an electric power company to build submarine cables from the mainland and developing wind energy generators.

The biggest treasure and the most attractive sights on Fangji Island are the well-preserved ecosystem, wildlife, and abundant undersea resources. Therefore, protecting the island's ecosystem is beneficial for both commercial profits and the island's ecosystem. The current owner of Fangji Island, Chen Min-cher, tries to conserve and rebuild the environment as much as possible after development. Resort construction was bound to destroy island forest while the efforts for recovery are necessary in the case of water and soil loss. Apart from the original plants on the island, the owner of Fangji Island introduced 25 kinds of plants from Taiwan. Before 2005, local fishermen illegally caught fish using explosives and poisons to increase output, which greatly affected the surrounding sea area. For this reason, the owner of Fangji Island asked most of the local fishermen to work on the island, which benefits both the local community and environment (translated from Peng & Tan, 2011).

Waste management is another significant problem on the island. A certain waste recycling system has been used there. This system involves pumping waste water up to the clarifier tank on the peak. After exposure and sedimentation, clear water is used for irrigation while the precipitate is used as fertilizer. Recyclable solids are shipped to the mainland while unrecyclable ones are burned on the island (translated from Peng & Tan, 2011).

Social Evaluation

Social evaluation is focused on the social carrying capacity or the ability of local communities to absorb new tourism projects in this area.

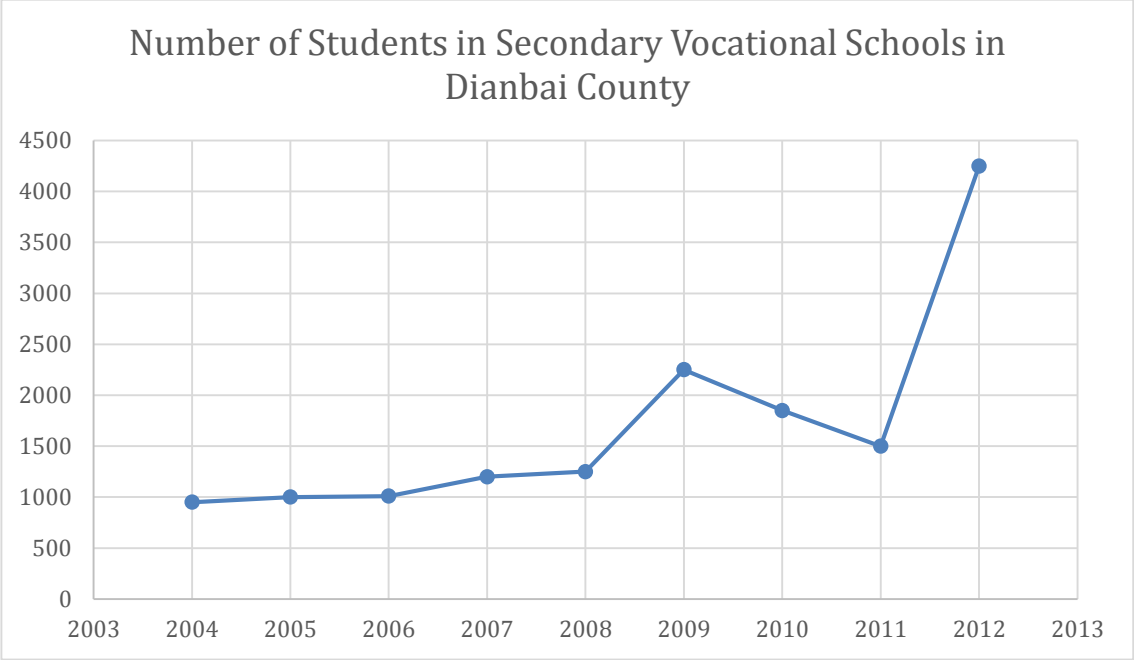
Labour Availability

Labor availability is evaluated according to the local availability of qualified personnel, as well as the community's readiness and capability to absorb new labor from another place.

Availability of Qualified Local Hospitality and Tourism Staff:

According to the data offered by Maoming City Statistic Department, the number of students in secondary vocational schools in Dianbai County increased dramatically from 2011 and provides Fangji Island with potential tourism labour (Figure 14).

Figure 14. Number of Students in Secondary Vocational Schools in Dianbai County.



Source: Maoming City Statistics Department (Retrieved June 1st 2015)

Capability of Accepting Employees with Residence on Island:

On Fangji Island, two residences were built for staff. All staff working on Fangji Island can apply for the residences as well as meal plans during work shifts. There are about 200 staff working in the Fangji Island Tourism Development Company with about 120 of them working full time on the island in different positions.

Level of Local Economic Development

The evaluation of local economic development focuses on the strength of the local economy in supporting island tourism development.

Availability of local products and services:

As for Maoming City where Fangji Island is located, its coastal and marine environment was traditionally associated with fisheries that provided most of the income of the city and constituted the main livelihood of the people. Agriculture, both historically and presently, plays an insignificant role in the economy. In recent years, local governments have focused on the planning and development of a new coastal area in Dianbai County consisting of an equipment manufacturing industry, light manufacturing, electrical industry, non-ferrous metal industry and petrochemical industry. For the support of these industries, four deep-water ports will be built or upgraded in the next few years (Translated from People's Government of Maoming City, 2014).

Dianbai County has abundant marine and fishery resources, forest resources, and mineral resources. Famous local products of Dianbai County are tropical fruits, seafood, and peanuts. Additionally, several deep-water ports located in Dianbai County have given this area a high value in the development of a logistics industry and a petroleum processing industry.

Local economic structure:

Since April 2014, the government of Maoming City decided to combine Dianbai County and Maonan District into one district contributing to its transition from a third-tier industrial supporting city to a modern coastal city. Areas that used to be farmland are being changed into modern factories since the China National Offshore Oil Corporation has decided to establish on the Liquefied Natural Gas Project in the Bohe Area. With the opportunities of speedy development in West Guangdong Province, Maoming City's

economic structure has been gradually changed to resourced-based, trade-oriented, productive-oriented and technological-based industry such as a hi-tech development zone, logistics zone and equipment industrial zone, together with selected chemical, light, textile or electronic industries such as food manufacturing, tourism and information technology industrial area.

Economic Evaluation

Economic evaluation is designed to focus on the market feasibility of tourism development, as well as its economic impact on the island destination.

Competitive Environment

Market trends:

In Maoming Coastal New District's planning, a livable city with modern industry will be built in the near future. Apart from the industry zone, tourism areas are also included in the district planning. The coastal tourism area and uninhabited island tourism development will be part of the development plan.

Competitors:

Near Fangji Island, located in Maoming City area, there is a strong competitor offering similar products to Fangji Island. The Coast of Romance is a tourism resort with the theme of love and romance. Giving full play to South-East Asian Island's desirable features, they are committed to building a coastal resort that combines the sunshine, sea, beach, coconut, flower, and love together. Compared to Fangji Island, they own higher quality beaches and larger development areas, and most importantly, have a lower cost

without the extra island transportation expenses.

Apart from the tourism destination, many accommodations are available for tourists in Dianbai County instead of staying overnight on Fangji Island. According to the hotel listed on the Ctrip tourism booking website, the price of Fangji Island's accommodation can be ranked as No. 14 among 43 hotels in Dianbai County (Table 17).

Table 17 *Alternative Accommodations near Fangji Island and the Daily Service Rate*

Hotel	**Service Rate**
Ronghua Hotel	￥57-￥77
Anxin Hotel	￥65
Youfang Accommodation	￥65
Guest House	￥65
Oriental Hotel	￥70
Shangwang Hotel	￥76- ￥86
Longcheng Hotel	￥76- ￥80
Chunlan Hotel	￥80- ￥91
Dongya Hotel	￥85- ￥90
Tairan Hotel	￥94
Shuidian Hotel	￥95- ￥100
Romance Resort	￥100-￥956
Gaohui Hotel	￥100-￥258

Mingyuan Hotel	￥100
Bohao Hotel	￥110- ￥120
Longdu Hotel	￥113- ￥170
Zhongcheng Hotel	￥118
Zhongya Hotel	￥118
Hengda Hotel	￥120- ￥188
Ruihu Hotel	￥132- ￥161
Fuli Hotel	￥138- ￥148
Nanwan Hotel	￥138- ￥168
Jinlongquan Hotel	￥139- ￥158
Milan Business Hotel	￥139- ￥148
Haiyue Hotel	￥141- ￥150
Xinshuidong Hotel	￥142- ￥180
Nanhaiwang Hotel	￥148
Huarun Hotel	￥148- ￥150
Junning Hotel	￥150
Zonglvyuan Hotel	￥151- ￥171
Junkaiyue Business Hotel	￥158
Fenghuangcheng Hotel	￥161- ￥167
Naxin Holiday Hotel	￥168- ￥288

Venus Holiday Hotel	￥169- ￥339
Times Holiday Hotel	￥180- ￥1624
Jinyuan Hotel	￥192- ￥346
Coastal Hotel	￥253- ￥578
Longteng Hotel	￥255- ￥563
Weston Hotel	￥268- ￥318
Ocean View Hotel	￥319- ￥654
Yushui Spring Resort	￥324- ￥3189
Biguiyuan	￥388- ￥1387

Source: Ctrip Tourism Booking Website (Retrieved June 1st 2015)

Project Feasibility

Ownership of island, estimation of required investment and financing model:

Chen Ming-cher, who is the first small island owner in China, was born in Taiwan. In 2004, he signed a contract with the provincial government of Guangdong and became the operator of Fangji Island for 50 years. Under the contract, this island is totally operated by Chen. However the local government only gets a certain amount of the administration fee annually from Chen in return for leasing the island. Before his career on small island development in Mainland China, Chen Ming-cher was a business person in Taiwan. He used to visit different islands in Southeast Asia for his diving interests and dreamed about having his own dive center (translated from Peng & Tan, 2011).

Fangji Island is not the first island he has owned. Chen has described himself as an ocean lover and began his island career on Hainan Province's West Island in 1999. Hainan Province, the southeast and warmest province in China, owns abundant tourism resources, which attract millions of inbound tourists every year. However, the tourism in Hainan Province focuses on offshore development. Instead of offshore tourism, Chen considered the nearby undeveloped small islands to be great tourism resources and would be the direction of development in the future. Proof of his successful prediction and business sense lies in the fact that there was a high demand for small islands. In 2003 and 2004, the annual rental fee of West Island was only 8,000 Yuan (approximately US$1,300), but the annual revenue reached more than 300,000,000 Yuan (approximately US$49,000,000) with an average 8,000 visitors and US$20 per capita consumption. Using his experience gained from Taiwan's small island tourism development, Chen introduced the latest offshore projects to Hainan such as deep sea fishing, motor boating, and speedboat parachuting. Chen's business on West Island reached a peak in 2003 and 2004, but ended in stagnation in 2007. He gave up the business on West Island because of vicious competition as well as the limitation on its small area. On West Island, he only rented a small part of the island of 0.07km^2 so that a lot of new projects could not be carried out. At the same time, the local government of Hainan Province became a shareholder in similar tourism companies on West Island, making it difficult to Chen's company to succeed. He left West Island and started looking for another island on which to use his island development experience (translated from Peng & Tan, 2011).

Developing model:

After a long time of observation, Chen chose Fangji Island, located less than 250km north of Hainan Province, as his new small island development. Fangji Island's tourism development model is simple: 'Government provides the land, and tourism projects are funded and operated by the private sector'. As opposed to the current uninhabited island leasing system that started from 2009, Chen did not need to pay the leasing fee. Instead, a management fee was paid to the local government annually. As for the island's operation, the local government did not participate. Chen's company took charge of overall development and management.

Future Plan:

Since the issue of the 'Island Protection Act' in 2009 and related detailed uninhabited island utilization regulations, all uninhabited islands must go through a new assessment process for their future. Fangji Island's plan must be approved by a review group constituted by relevant experts and scholars. In January 2013, 'Fangji Island Tourism Resort Planning (2012-2020)' compiled by the Newspace Tourism Planning Company was approved by the review group under the jurisdiction of the provincial government.

It is planned that Fangji Island will be built into a yacht terminal providing fueling, maintenance and anchorage yachts due to its excellent location on transportation routes. Fangji Island is located on the route between Hong Kong, Macau, Shenzhen and Hainan Province. As a result, this will be a promising industry for the island, though professional facilities and more docking areas for yachts will be needed in the future. This will require

comprehensive planning.

On the other hand, expansion is possible in the future on Xiaofangji Island. Xiaofangji Island is 6.3 miles away from Bohe Harbor, which is located about 3 miles north of Fangji Island. Since 2011, Xiaofangji Island has been listed as an uninhabited island available for tourism development. With an area of 1.2 km^2, Xiaofangji Island has tourism resources equal to Fangji Island, such as white sand beaches on the south and west side and rocky cliffs on the west and north. Because Xiaofangji Island is an uninhabited island, the natural forest has been preserved, and coastal water is clear with 8 meters' visibility. Since 2011, many developers have shown their interest in it, including the owner of Fangji Island, Chen Min-Cher. Currently, all the applications are in the selection and approval stage by the government. Chen Min-Cher's plan is to develop exclusive small island resort complexes on Xiaofangji Island, combining his yacht transit station plan in Fangji Island. He will also invest in the new coastal tourism region in Maoming City. According to Chen's plan, Fangji Island will become a 5A-rated tourist attraction, which is the highest level in Chinese Tourist Attraction Rating Categories, with the largest diving and fishing base in China in the next three years.

Economic Evaluation:

The dominant economic income of Fangji Island Tourism Developing Company is from inbound tourists' expenditure on different tourism services. The price of each tourism product is as follows:

Table 18 *Price of Fangji Island's Tourism Product*

Entertainment	
Adult Entrance Fee	￥160
Child Entrance Fee	￥90
BBQ + Beer	￥78
Evening Diving	￥530
Comprehensive Diving	￥530
Boat Diving	￥350
Basic Diving	￥240
Motorboat Round Island Trip	￥180
Motorboat	￥150
Flyfish Water Activity	￥130
Snorkeling	￥100
Water Ski	￥120
Banana Boating	￥100
Boat Fishing	￥120
Single Ufo Water Activity	￥150
Double Ufo Water Activity	￥260
Unpowered Vessel (30 Mins)	￥100
10 Seats Golf Cart (60 Minutes)	￥280

4 Seats Golf Cart (90 Minutes)	￥380
6 Seats Golf Cart (90 Minutes)	￥480
Electronic Motorbike (60 Minute)	￥60
Crab Catching	￥100
Boat Fishing And Crab Catching	￥200
5D Cinema	￥20
Accommodation	
Sea Motel (Per Night)	￥310
Bohe Harbour Hotel (Per Night)	￥310
Ocean View Hotel (Per Night)	￥310
Garden Villa (Per Night)	￥310- ￥1200
Phoenix Chalet (Per Night)	￥410
Camping (Per Tent)	￥100
Conference Room	￥1700- ￥3000
Restaurant (Varies According To Season And Dishes)	

Source: Fangji Island official website (Retrieved June 1st 2015)

Combining Tables 17 and 18, it is evident that the traveling price in Fangji Island is relatively higher than other nearby tourism destinations. In another way, Fangji Island's tourism industry may take a higher risk on losing its attraction if the island resources are degraded or destroyed. Additionally, islands that are easily accessible from the mainland could find themselves inundated with relatively low-spending day visitors. For example,

most visitors to Jeju Island in South Korea stay on the main island but are encouraged to make day trips to the smaller island of Udo and Marado. Since recent visitors do not use accommodation on these smaller islands, their expenditure is relatively low, so that the islands earn relatively little from these visitors. As for Fangji Island, both one day and two-day visits to Fangji Island are available for tourist groups from a travel agency. The one-day visit is more popular because of the lower costs, for accommodation and dining outside the island.

Chapter Five: Case Analysis

In general, the concept of sustainable development refers to the equilibrium between natural resources and human beings. There are three levels of concerns about sustainable development: economic, environmental, and social including both positive and negative impact. Tourism in uninhabited island might bring the following benefits:

Table 19 *Positive Impact of Tourism on Uninhabited Islands*

Financial and Economic Benefits	Employment Rate increase Income increase Local Economy Stimulation and Diversification Local Manufacture Promotion Local Tax Revenues Accumulation
Socio-cultural Benefits	Aesthetic, Spiritual Promotion Environmental Education Local Culture, Crafts and the Arts Promotion
Environmental Benefits	Ecological Protection

However, natural and socio-cultural environments, which island tourism highly depends on, are also agents of an island's dramatic change or even degradation. Tourism is considered as the source of several problems regarding its impact on local economy and environment. For example, urban development has been accompanied by aesthetic contamination with noise pollution, problems with waste and residual water, the disappearance of the traditional local architecture, as well as the development of a road infrastructure impacting on the scenery of the area (Bianchi, 2004). Island tourism

development is the same as urban development even though ecotourism has been introduced. Since several tourism attractions are created by investors who are simply motivated more by profitability than the concept of sustainable development, tourism integrates some strategies and marketing considerations that marginalize aspects of environment protection. The costs related to tourism development on uninhabited islands may often jeopardize the benefits it produces as follows in Table 20:

Table 20 *Negative Impact of Tourism on Uninhabited Islands*

Financial and Economic	Costs of Environmental Protection Increased Maintenance Fee Increased
Socio-cultural	Conflict Between Local and Foreign Culture Increased
Environmental	Natural Resources Deterioration due to exceeding carrying capacity development

Source: Author

Transforming Fangji Island into a place that combines ecotourism, science and resort is the ultimate goal of the lessee. Ecotourism is one of the most important segments in Fangji Island, and the island operators do try to use preservation methods on ecosystem maintenance. However, if ecotourism was to grow on the island without proper regulation, it could easily become as harmful as mass tourism on the local environment. Because ecotourism tends to take place in areas with rare and fragile ecosystems, it could be more harmful than mainstream tourism.

Fangji Island has been developed into an island amusement park and set of resorts that rely essentially on respecting fauna and flora, and maintaining the equilibrium between the park's economic activity, the visitors' enjoyment, and the respect for landscape and wildlife. However, in order to maximize income, investors are primarily looking at how to provide leisure and entertainment for tourists at a cost of natural resources that exceeds the ecological limits. Fangji Island has on average about 2000 inbound tourists per day and in high season this number can reach 6000 per day. The consumptive leisure lifestyle of the tourists may be harmful to Fangji Island, for example, in sewage, garbage and waste pollution, as well as reef destruction and beach erosion. Moreover, ecotourists are always looking for new destinations instead of staying on the "beaten track", whereas mainstream tourists are more willing to stay in established resorts. Therefore, since 2013, the project name of Fangji Island tourism planning has been changed to 'General Planning of Fangji Island Tourism Resort and Park' compiled by New Space Tourism Design and Research Institute from the original ecotourism destination label.

Since Fangji Island is still classified as an uninhabited island, the analysis of economy and society is based on the nearby communities, Dianbai County. The impacts of tourism development in Fangji Island are as follows:

Economic and Social Impacts

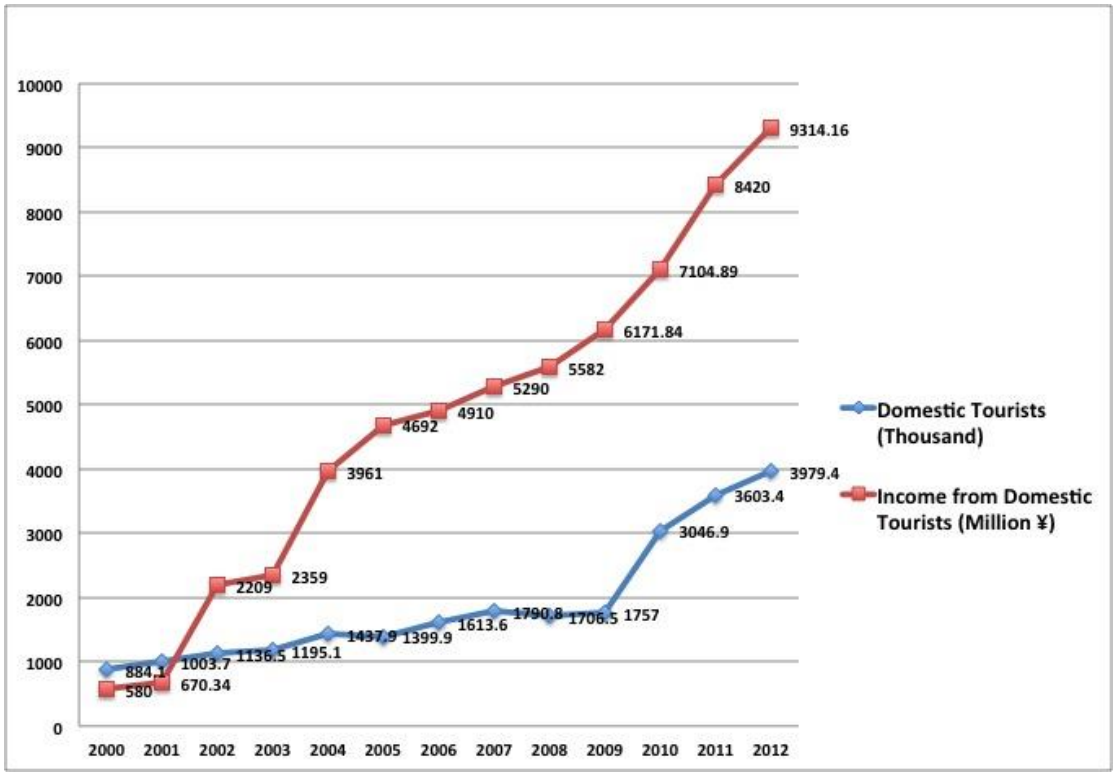
Cost-Benefit Analysis

The developer Chen Min-Cher has invested more than 500 million Yuan (about US$83 million) in tourism construction on Fangji Island since 2004. From his plan, it is projected that he will invest more on Fangji Island as well as in nearby island destinations.

The direct benefit to the island lessee is from the expenditures of tourists. However, since the income data for the company is not available to the public, this study will not incorporate this data. However, the income can be estimated by the number of inbound tourists from local communities and related statistics (Figure 15) because the number of tourism destinations in Maoming City is limited and the short distance between each of them allows the chance to sell a combined vocation product that includes Fangji Island.

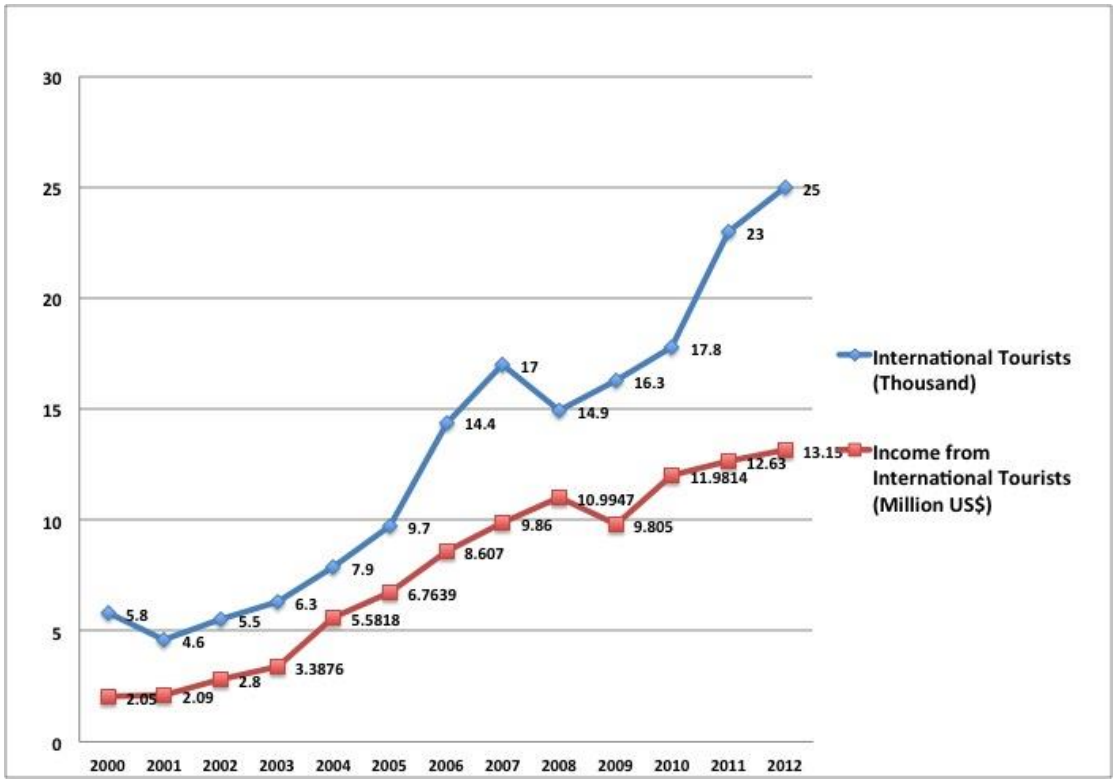
According to Figure 15 and 16, Maoming City's inbound tourists are primarily domestic, and the number of domestic inbound tourists have been increasing steadily with a sharp increase after 2010. The income generated by the tourism industry has increased along with the growth of the number of inbound tourists.

Figure 15. Statistics of Maoming's Inbound Tourists from China.



Source: Maoming City Statistics Department (Retrieved June 1st 2015)

Figure 16. Statistics of Maoming's Inbound Tourists from outside China.



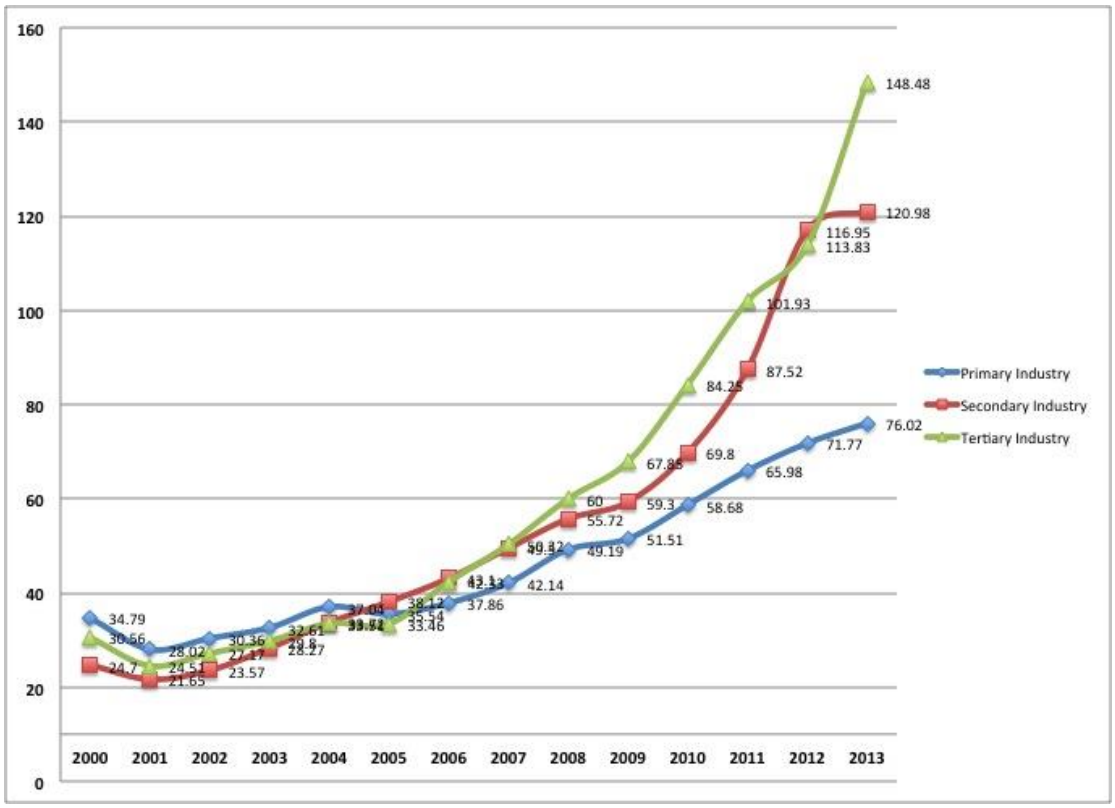
Source: Maoming City Statistics Department (Retrieved June 1st 2015)

Tertiary Sector Increased

Tourism belongs to the group of tertiary industrial sectors, and it is a relatively new industry in the local community. In Dianbai County, primary industries mainly involve agriculture and fishing; secondary industries are different kinds of manufacturing while tertiary industry mainly involves real estate investment and the service sectors. According to the data received from Maoming City Statistics Department, the presence of the tertiary industry in Dianbai County, as measured in total income generated, has increased since 2005, and since 2006/2007, now exceeds the presence of the primary industry in the County (Figure 17). It would not be inaccurate to assume that the island tourism

development has had a relatively large impact on the growth of the tertiary sector as a whole.

Figure 17. Dianbai County's Industry Income (Billion Yuan).



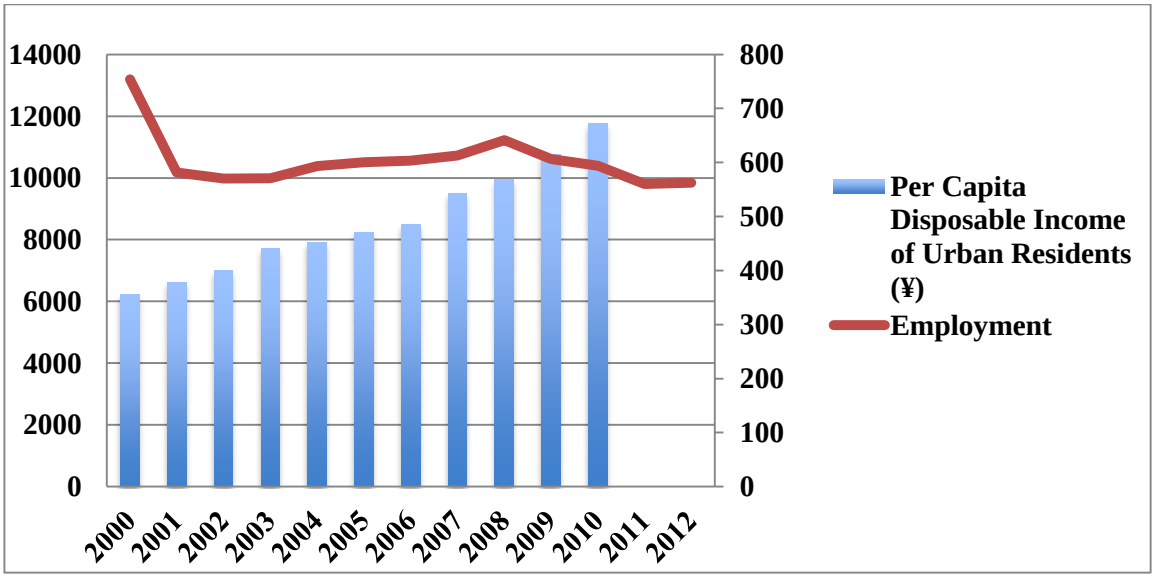
Source: Maoming City Statistics Department (Retrieved June 1st 2015)

The Multiplier Effect

When considering the economic impact of tourism in the local communities, much attention is paid to the principle of the multiplier effects. Although a multiplier effect may be difficult to assess in contexts like this, surrogate indicators may help describe the indirect impacts of tourism. These include total employment (Figure 18), urban residents'

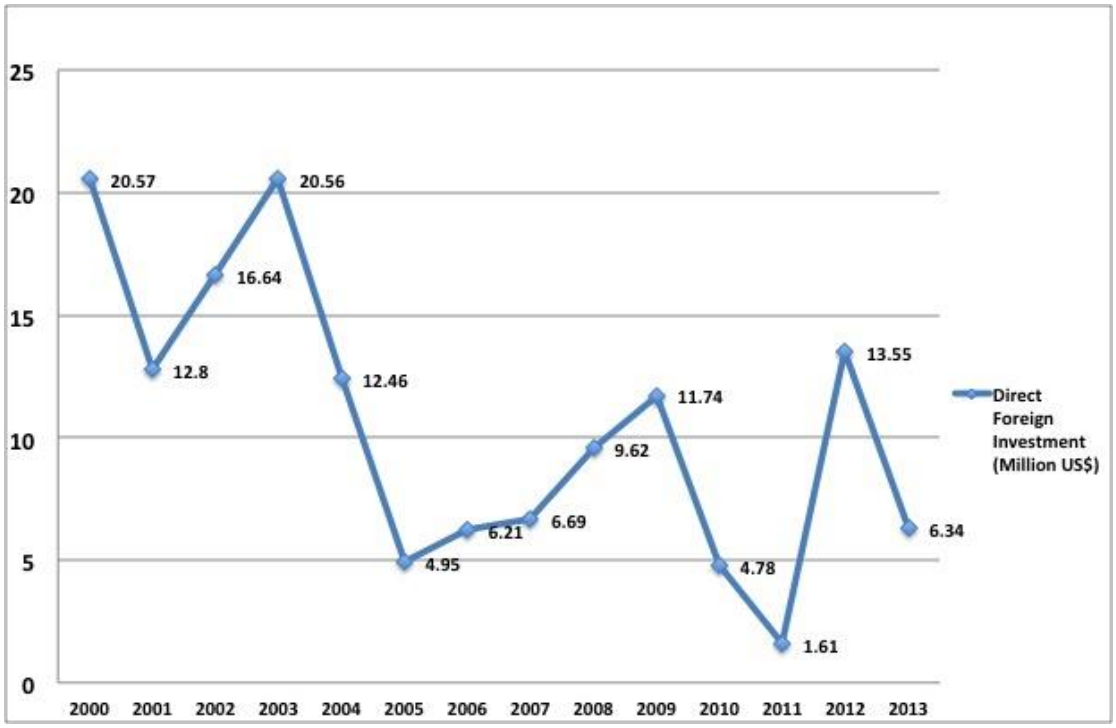
per capita disposable income (Figure 18) and direct foreign investment (Figure 19). Even though local residents' disposable income has increased gradually, the number of people employed has been declining since 2008. After Fangji Island's original investment in 2004, direct foreign investment has been inconsistent and has decreased in the most recent year for which data are available (2013).

Figure 18. Per Capita Disposable Income (Yuan) of Urban Residents and Employment Numbers in Dianbai County, 2000 to 2012.



Source: Maoming City Statistics Department (Retrieved June 1st 2015)

Figure 19. Direct Foreign Investments in Dianbai County (Million US Dollars), 2000 to 2013.



Source: Maoming City Statistics Department (Retrieved June 1st 2015)

Social Impacts

Apart from the benefit for local economies, the development of Fangji Island has also improved national defense and prevented haphazard island development. Water and electricity facilities, as well as pier and road construction, have greatly improved the military value of Fangji Island. Management from a single private owner has helped to avoid predatory development in the island such as illegal fishing, illegal logging, and deterioration of the land.

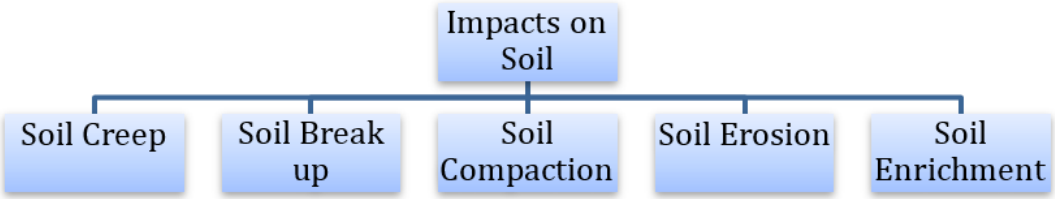
Ecosystem Impacts

Impact on Vegetation and Soil

With their resources and unique geographic features, islands are habitats for many species. Some native plant species can only be found in island systems due to their endemic history of evolution, including being sheltered from possible threats from human activities. Even though the total area of all the islands in the world may only constitute less than 7% of the global land surface, one in six of Earth's known plant species occurs on oceanic islands (Fisher, 2004). Additionally, the influence of forest loss in island systems is much more severe than forest loss on continents because of the limited geographic space, presence of endemic species and rare ecosystems (FAO, 1999).

The impact of tourism on soil and vegetation may occur in several ways and can affect uninhabited islands immediately or chronically. The impacts on vegetation are mainly due to the transformation of forestland and the limited soil capacity. However, the impact on soil is primarily because of soil removal and relocation. Soil removal and relocation in tourist destinations are caused by the construction of various facilities such as accommodations, catering, and transportation infrastructure. Different kinds of impacts from human activities on soil can be seen in Figure 20.

Figure 20. The Impacts of Tourism on Soil.



Source: Ceballos-Lascurain (1996)

All walking activities on uninhabited islands may cause soil creep, soil break up and soil compaction. The construction of any paths, tracks, or even campsites may also degrade the soil quality by increasing the pressure on the soil. Soil erosion is normal on small islands because wind and water, two of the most common factors associated with islands, accelerate the process. High rainfall intensity and runoff as well as strong winds due to the marine climate work together to degrade the vegetation on small islands thereby increasing the likelihood of soil erosion on uninhabited islands (Ritter, 2012).

Soil enrichment is usually caused by the organic litter left behind by tourists. The effect of soil eutrophication on the environment may not be widely known, but its ripple effect on seawater eutrophication is well understood and widely seen (BonsDorff et al., 1997; Gill, Lanza & Rast, 2011). Before its development, 95% of Fangji Island was covered by forest. In order to meet the needs of tourists, this has now decreased to 80%. That is to say, at least 15% of the natural forests have been destroyed for the construction of hotels, roads, and other tourism facilities, apart from the man made forest which was planted after deforestation. Additionally, as noted above the increasing number of inbound tourists gives rise to soil pressure from trampling that may cause soil hardening, moisture permeability reduction, an increase in soil and water loss (Figure 21), as well as an increase in the number of bare areas and organic matter reduction.

Figure 21. Staff Cleaning Artificial Stream Accumulation.

Source: Picture taken by author on Fangji Island, September 20, 2014

Impact on Sanitation

Sanitation problems have troubled countries around the world for years. "In developing countries, 90-95% of all sewage and 70% of industrial wastes are dumped untreated into surface water" (Millennium Ecosystem Assessment, 2005a, p117). For small islands, the disposal of wastes is a serious constraint to sustainable development and both land and sea-based sources of pollution require urgent attention. Island tourism brings not only numerous tourists onto the island but it also produces household garbage such as sewage from hotels, restaurants, and tourism activities, plastic bags and bottles discarded by tourists, as well as construction and maintenance waste. Small islands' limited resources, combined with an increase in polluting and hazardous substances due to increased tourists' activities, are contributing factors to the difficulty in managing waste. On Fangji Island, waste disposal can be classified into three parts: waste incineration, landfill, and waste recycling. Apart from the recyclable waste, other waste will be disposed

on the island. Incineration is the most common method of waste disposal in China, and is the same on Fangji Island (Figure 22). Incineration may cause serious pollution of the air, water and soil (Table 21). In addition, there are five sets of generators on Fangji Island, operating alternately, consuming US$30 million of diesel fuel every year and causing new environmental pollution (Table 22). Using estimates of the average price of diesel in China during 2014, then approximately 236 tons of diesel were consumed on the island during that year.

Figure 22. Staff Burning Away Discarded Waste in Fangji Island.

Source: Picture taken by author in Fangji Island, September 20, 2014

Table 21 *Pollutants from Incinerators*

Pollutant	Health and Environmental Effects
Acid Gases	
Sulfur dioxide	Aggravates symptoms of heart and lung disease. Toxic to plants. Can erode statues and corrode metals. Precursor to acid rain.
Nitrogen oxides	High concentrations can be fatal; at lower levels, can increase susceptibility to viral infections. Toxic to plants. Precursor to acid rain.
Organics	
Dioxin and furans	A proven human carcinogen according to the World Health Organization's International Agency for Research on Cancer.
PCBs	High exposure can cause chloracne, liver disorders and jaundice. May cause birth defects.
Heavy Metals	
Lead	Probable human carcinogen according to U.S. EPA.
Inorganic mercury	Can cause serious neurological disorders and degenerative kidney problems. Linked to birth defects.
Methyl mercury	Reproductive toxin. Also an endocrine-disrupting chemical, impairing normal thyroid functions.

Cadmium	May cause lung cancer, also linked to kidney disorders.
Chromium	May cause liver and kidney damage and respiratory disorders.
Arsenic	May cause liver and kidney damage.

Source: Essential Actions (Retrieved June 1st 2015)

Table 22 *Pollutants from Diesel Generators*

Pollutant	Health and Environmental Effect
Carbon monoxide (CO)	Can cause eye irritation and choking sensations.
Hydrocarbons (HC)	Major contributors to the characteristic diesel smell and also has a negative environmental effect, being an important component of smog.
Nitrogen oxides (NO_x)	Toxic and causes smog.
Sulfur dioxide (SO_2)	A colour less toxic gas with a characteristic, irritating odor which has a profound impact on the environment being the major cause of acid rain.
Diesel particulate matter (DPM) **Solids** **SOF** **SO_4**	When released into the atmosphere, DPM can take the form of individual particles or chain aggregates. Because of their small size, inhaled particles may easily penetrate deep into the lungs when combined with other toxins.

Source: Nett Technology Inc. (Retrieved June 1st 2015)

Impact on Animal Life

Fangji Island's beautiful marine landscape and rich biodiversity have become a lure for many professional as well as amateurs divers. The seashore water activities and especially the diving business on Fangji Island have also increased as a result of the continuous growth of inbound tourists. Because of the limited sea area that is being used for various water activities simultaneously, conflicts between human activities and environmental protection have arisen. Diving, which is the most popular activity on Fangji Island, has been widely considered as a seawater recreation activity that will directly impact the marine environment. Previous research has shown that coral reefs are one of the most vulnerable habitats facing visible effects from island tourism (Hall, 2001). Divers may cause damage to coral reefs directly with their physical contact (Rouphael & Inglis, 2001) or indirectly by polluting the surrounding water (Hall, 2001).

The impact of tourism on the marine ecosystem is a result of customers' food consumption, foreign species introduction and overfishing. Overfishing and illegal hunting are common for island destinations in order to meet tourist's growing demand for delicacies. "Current patterns of use of capture fisheries are unsustainable. Humans increased the capture of marine fish up until the 1980s by harvesting an ever-growing fraction of the available resource. Marine fish landings are now declining as a result of the overexploitation of this resource" (Millennium Ecosystem Assessment, 2005a, p.105). Chinese tourists' special diet of exotic food species accelerates the slaughter of rare aquatic products. For example, a turtle was shown in an aquarium outside a seafood restaurant in Fangji Island when this field research was being undertaken even though the turtle is one of the rare animals protected by law in China (Figure 23).

To enrich the ornamental value of the island, some new species were introduced as attractions. On Fangji Island, pineapple trees, deer, and peacocks are foreign species which have been introduced with development. Whether these foreign species may cause ecosystem disorders or not is uncertain. However, a lot of research has been done on island conservation by new species recovery (Cowie, 2001; Keppel et al., 2014; Meyer, 2014; Russell & Holmes, 2015;). On the other hand, tourism activities on the island may influence the number and density of wildlife, especially birds and marine animals.

Figure 23. Turtle Shown in Restaurant Seafood Court in Fangji Island.

Source: Picture taken by author on Fangji Island, September 21, 2014

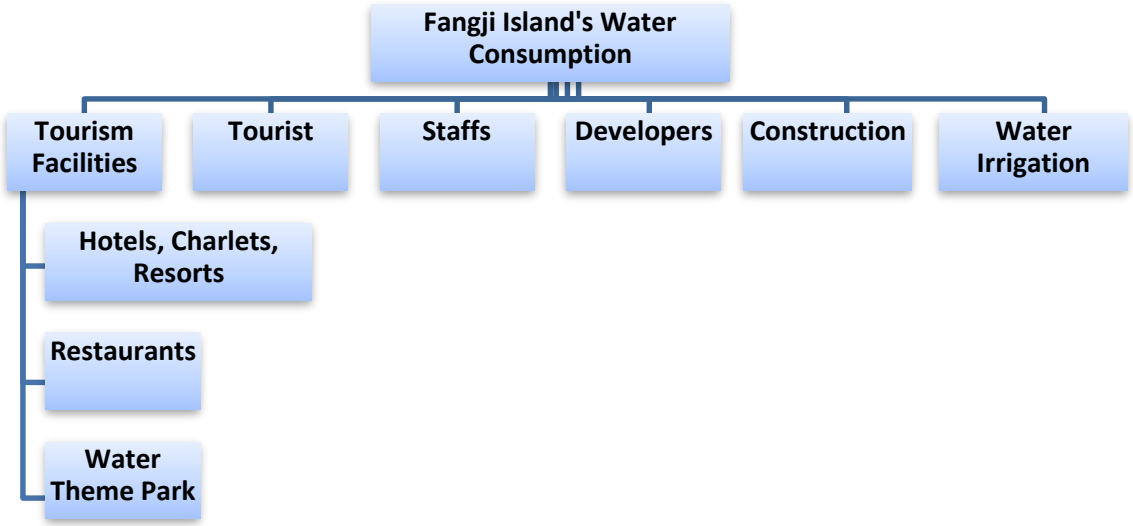
Impact on Water Resources

A lack of fresh water is always the biggest problem for small islands, especially uninhabited islands that rely mainly on rainfall harvesting, surface reservoirs, and surface flows for the majority of their resources. “Current patterns of human use of water are unsustainable. From 5% to possibly 25% of global freshwater use exceeds long-term accessible supplies and is met through engineered water transfers or the overdraft of

groundwater supplies" (Millennium Ecosystem Assessment, 2005a, p.17).

Water is another essential segment of the island that could be influenced by tourism activities. First, the rising number of inbound tourists and island tourism facilities greatly increases average daily water consumption, which causes an overuse of ground water on the island (Figure 24). On Fangji Island, ground water comes mainly from rainfall and wells. However, imported water from the mainland is also needed. Over-exploitation of fresh water on the island will cause the possibility of drought or even salinization on the island due to the massive quantities of salt water that may mix with it. Second, the increase in the number of inbound tourists creates a growing demand for proper sewage water disposal from hotels and other recreation buildings. Improper treatment of this sewage water could increase the number of devastating pollutants to the surrounding waters when it is discharged. Third, different kinds of water activities such as fishing, diving and boating may have an adverse impact on water resources without sustainable management.

Figure 24. Sources of Water Consumption of Fangji Island.



Source: Author

The impact of island tourism on water degradation has been noticed and discussed for many years. The island of Mallorca in Spain (Garcia & Servera, 2003), the island of Zanzibar in Tanzania (Gössling, 2001), and the island of Bali in Indonesia (Cole, 2012) have each experienced water degradation from tourists activities.

Oil spills from boats, waste on the beach, and sewage from restaurant kitchens may also pollute the surrounding water. The effect is not only to the water itself but also to the entire ecosystem. Due to the high potential to be polluted by chemicals and nutrient substances, the process of eutrophication will have significant effects on the inhabitants. Research on the distribution and pollution evaluation of heavy metals in the water field around Fangji Island, concluded that this area was polluted by mercury, arsenic and lead during 2004 and 2005 (Shen et al., 2008). During these two years, Fangji Island was under massive construction before it opened to the public in May 2005. Therefore, this

development has to be considered one of the primary causes for the heavy metal pollution in this area.

According to the Bulletin of Marine Environment provided by the Maoming Oceanic and Fishery Administration, an annual test of water quality in the Maoming City Sea Area including Fangji Island Sea Area is available to the public. From the annual tests, the main pollutants in this area are petroleum, inorganic nitrogen level, phosphate content and chemical oxygen demand content. Apart from water quality, marine sediment quality and marine biological quality are also being considered. According to the Bulletin of Marine Environment Guangdong Province, China, the evaluation criteria are classified into three classes: (I) Areas that are used for marine reserve, endangered species reserve, mariculture zone, bathing beach and any other industry related to food, (II) areas that are used for normal industry, (III) areas that are used for the harbour. (Translated from Administration of Ocean and Fisheries of Guangdong Province, 2006, p6)

In 2004, the water quality test in South Fangji Island Sea Area met the first standard, while the test in 2009 showed that this area was listed as lightly polluted by reactive phosphate. As for marine sediment quality, South Fangji Island area was listed as class II polluted by arsenic. Even though the water quality in North Fangji Island was cleaner, the harbour where the island ferries are most present has been badly polluted by petroleum pollutants since 2004.

Impacts on Lancelets Reservation Area

The living habitats of lancelets (Branchiostoma balcheri) are found mainly in shallow temperate and tropical seas. However, the lancelets' density and yield found in these areas are low since they have demanding requirements for their living environments such as bottom sediment, water quality, and the presence of other species. As for the scientific research value of lancelets, they can be regarded as a living fossil, an important object of study in zoology as they provide indications about the evolutionary origins of the vertebrates. Lancelets serve as an intriguing comparison point for tracing how vertebrates have evolved and adapted. Although lancelets split from vertebrates more than 520 million years ago, their genomes still hold clues about evolution on how vertebrates have employed old genes for new functions. As for their nutritive value, lancelets contain eight kinds of essential animal acids for the human body as well as various vitamins, especially vitamin B1 and B2.

For the purpose of protecting and rescuing endangered species, and for protecting and practicing the rational utilization of wildlife resources and maintaining ecological balances, the 'Law of the People's Republic of China on the Protection of Wildlife' was issued on November 8, 1988. According to the law, the state shall offer specific protection to the endangered species of wildlife that are rare or near extinction. The wildlife under specific protection shall consist of two classes: first and second-class protection. Species that listed on these two class are the species of terrestrial and aquatic wildlife which are rare or near extinction and the species of terrestrial wildlife which are beneficial or of important economic or scientific value. First class protection level is the most urgent on protection, while the second class is urgent one. Moreover, the departments of wildlife

administration shall, in the main districts or water areas where this endangered wildlife live and breed, designate nature reserves and strengthen the protection for and management of the species.

In China, lancelets were harvested commercially for food until 1988 when they were listed as a second-class protection species. The Xiamen sea area used to be a famous lancelet fishing ground with a maximum annual output of 282 tons in 1933. According to the research, there were an estimated 102 individual/m^2 lancelets in the Xiamen sea area during 1987 to 1988; 1050 individual/km^2 in 1989; 142 individual/m^2 during 1994 and 1995; 68.7 individual/m^2 in 2001 and 29 individual/m^2 in 2009 (Translated from Weng et al., 2010). These results show that the density and area of lancelets was getting smaller because of the polluted environment and overfishing (Translated from Weng et al., 2010). Also, undersea silt accumulation caused by coastal construction, bottom sediment destruction caused by excessive sand pumping and aquaculture development might have greatly influenced the lancelet living environment in Xiamen (Translated from Zhang et al., 2011). Because of the decline in lancelets in this sea area, a nature reserve was designated in 1991. However, both the population number and the distribution area of lancelets are still decreasing due to continuous offshore infrastructure and artificial island construction.

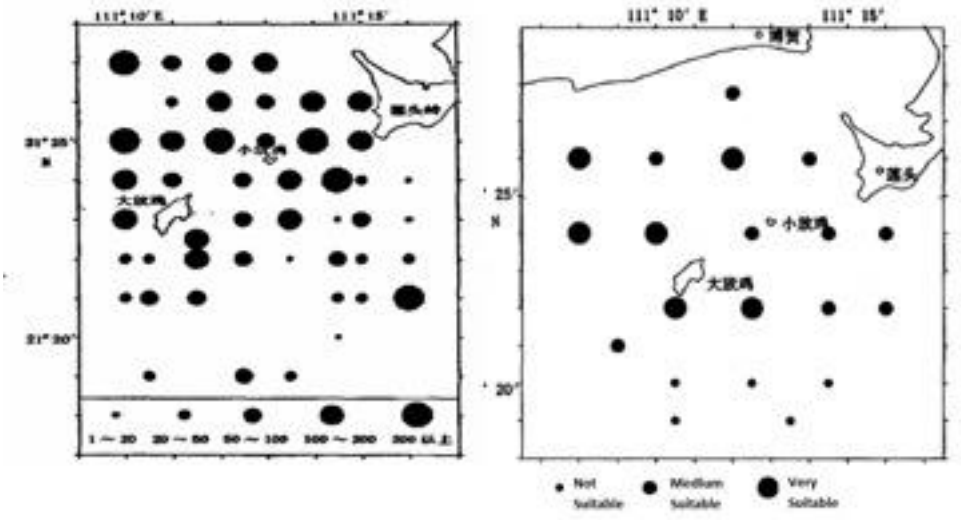
Lancelet habitation in the Fangji Island sea area was first found in 2002, with approximately 3,300 tons. Guangdong Ocean University was authorized by Maoming Oceanic and Fishery Administration to investigate the living environment of lancelets in Fangji Island sea area from August 2003 to May 2004. Another investigation was carried out from April 2007 to March 2008, providing valuable information on lancelet

conservation in the Fangji Island sea area.

During 2004 to 2005, 145 investigation stations were established as lancelet collectors covering a total area of 195.5 km^2 (Translated from Chen et al., 2008). From 2007 to 2008, 142.6 km^2 of the conservation area was investigated, including core areas of Fangji Island and Xiaofangji Island (Translated from Lin & Feng, 2009). Based on the same formula for the extant abundance of fish, the first investigation found that the total amount of lancelet reached about 3330 tons with an average density of 51-86 individual/m^2 while the second investigation decreased to about 3200 tons with an average density of 108 individual/m^2. Additionally, compared to the general distribution of lancelets during the 2004-2005 research, the distribution of lancelet habitat suitability index during the 2007-2008 research was much smaller, indicating that some of the areas were no longer suitable for living lancelets within the reserve area (Figure 25). The result of the increasing lancelets' density and decreasing total amount demonstrates that some areas' habitat suitability index for lancelets is decreasing due to various characteristics such as bottom sediments, depth of water, transparency and algae density. Subsequent research has indicated that the living environment was still acceptable for lancelets, but it was likely to become worse with the increasing pace of tourism development, over fishing, and urbanization (Translated from Lin & Feng, 2009).

Figure 25a (Left). General Distribution of Lancelets on Fangji Island during 2004-2005 Research.

Figure 25b (Right). Distribution of Lancelets Habitat Suitability Index on Fangji Island during 2007-2008 Research.



Sources: Left Figure 25a (Chen et al., 2008); Right Figure 25b (Lin & Feng, 2009)

The main food source for lancelets are different kinds of plankton. The Fangji Island water area has abundant plankton resources including some red tide plankton. Red tide is a phenomenon known as an algal boom (large concentrations of aquatic microorganisms) caused by a few species of dinoflagellates. Because of the low phytoplankton diversity and uniformity index in the Fangji Island sea area, coupled with the flourishing aquaculture and tourism industry nearby, research has indicated that there would be a high likelihood of red tide due to eutrophication in the sea area (Translated from Feng et al., 2008).

Unintended Impacts

The discussion of the dependence and impact on nature by human society has been a part of scientific research since the 1960s, highlighting the importance of ecosystems in providing vital services on which human activities rely (Helliwell, 1969). In regards to tourism, the visible impacts to the environment are clear; some indirect or unintended consequences should also be seriously considered. "The law of unintended consequences, is that actions of people—and especially of government—always have effects that are unanticipated or unintended" (Norton, 2008). This law could also be renamed unanticipated consequences, unforeseen consequences or unintended impacts. The famous French political economist, Frédéric Bastiat (Bastiat, 1850) proposed that any economic activity could cause effects that could be obviously seen, and the one that could not be seen without foresight. Furthermore, he pointed out the difference between a good economist and a bad economist as follows:

> Between a good and a bad economist this constitutes the whole difference—the one takes account of the visible effect; the other takes account both of the effects which are seen, and also of those which it is necessary to foresee… Hence it follows that the bad economist pursues a small present good, which will be followed by a great evil to come, while the true economist pursues a great good to come, at the risk of a small present evil (Bastiat, 1850, p.1).

Thus, apart from the previous analysis of the current impacts of tourism on Fangji Island, there are unintended consequences of tourism activities that need to be assessed. In complex ecosystems, any human behaviour will usually have unintended impacts,

many of them of the negative. Since the Fangji Island development was one of the first examples of China's uninhabited island utilization plan, no previous experience was available from other uninhabited island developments. However, previous experience from other island regions may help to provide some guidance to the 'unintended' impacts.

Taiwan is one example. China's outbound tourism has brought extensive income to Taiwan but has also created higher carbon emissions and a large local ecological footprint. It is estimated that the direct carbon emission per dollar and overall carbon footprint per Chinese inbound tourist is approximately 20% greater than other markets because of a higher level of consumption, longer length of stay, and closer distance between the two regions. The total water consumption is higher as well due to the higher spending on food-related products that require substantial water from the agriculture sector (Sun & Pratt, 2014). The amount of tourists' energy consumption in Penghu Island in Taiwan is much more than local people; for example, the amount of solid waste discharged is 1.95g while for local people it is 1.18kg (Kuo & Chen, 2009).

All these pollutants may have significant impacts on other species because islands provide important habitats for them and in turn these species have enormous economic and scientific value. It is widely known that many plant-derived compounds have been used for medicinal drugs, either in their original or semi-synthetic form, and in the future, plant-derived compounds will continue to play a significant role in medicines (Salim et al., 2008).

As an example, the mangrove is one of the most important components of island and marine ecosystems with various large and extensive types of trees up to medium

height providing nursery habitats for many species (Nagelkerken et al., 2002). Moreover, the mangrove ecosystem is a largely unexplored, but potential source for the discovery of anti-infection and anti-tumor compounds that can be used to treat neurodegenerative diseases and diabetes (Hong et al., 2009). According to Dr. Han Wei-Dong, associate professor of botany at Zhanjiang Ocean University, the mangrove area was about 43,000 acres in 1950, but the recent rapid expansion of aquaculture and development has caused a significant degradation with only 31,000 acres in 2002 even though a Zhanjiang Mangrove National Nature Reserve had been established to protect mangrove (Mangrove Action Project, 2003).

Summary of Analysis

The increasing human population pressures have made island systems face a series of problems regarding their insularity. The green level of an island system has changed dramatically due to the heavy pressure from the growing population, exploitation, and consumption. On some islands, the human footprint has even exceeded critical thresholds, particularly along the coastal fringe, coastal forests, dunes, mangroves, coral reefs, and seagrass meadows which are being replaced by all kinds of infrastructure related to agriculture, aquaculture, coastal urban sprawl, industrialization and resort development (Millennium Ecosystem Assessment (2005b).

According to the management law for China's uninhabited islands protection and utilization issued in 2003, China encourages the private sector to lease and develop the uninhabited island in a sustainable way. Under the approval of the provincial government, Fangji Island was leased to a private company for a period of 50 years from May 2004 for

the purpose of developing an ecotourism project on the island while preserving its natural environment. However, since the island leasing system was out of date with the legal document at that time, the environmental assessment is far from satisfactory. This field study reveals that the lessee has been in breach of several conditions of the 'Island Protection Law' issued in 2009 and the 'National Island Protection Planning System' issued in 2012. These breadths are listed below:

Condition #1: According to article 30, the development and utilization of an utilizable uninhabited island as determined in the national island protection plan shall comply with the protection and utilization plan on utilizable uninhabited island, and strict ecological protection measures shall be taken to avoid any damage to the ecosystem of the island and its surrounding waters.

Observation #1: A degradation of soil and plant life, loss of wildlife, pollution of surrounding sea area and environmental sanitation problems have occurred on the island, while in its surrounding waters, lancelets' reservation area is gradually being polluted.

Condition #2: In the construction of buildings or facilities on a utilizable uninhabited island upon approval, the total number of construction, the heights and the distances from the coastline of the buildings or facilities shall be restricted according to the protection and utilization plan on utilizable uninhabited islands, so as to make the buildings or facilities in harmony with the surrounding vegetation and landscape.

Observation #2: According to the original island development plan submitted by the lessee, most of the material to be used for construction was to have been wood, something the island has in abundance. However, concrete and bricks were used in island

facilities in order to withstand the typhoons. A few concrete statues were seen on Fangji Island that were either very close to the beach or in the forest.

Condition #3: On utilizable uninhabited island which is legally determined as one for tourism activities and in its surrounding waters, no residential settlement shall be constructed and no productive farming shall be allowed.

Observation #3: Approximately six farming cages were seen very close to Fangji Island being used mainly to raise pompano fish.

Fangji Island is a sanctuary for wildlife and plants. Before 2004, it was an uninhabited island with limited human behavior. Its footpaths, which were little used, could still allow grass to grow on them. Next to the footpaths there were still many bird nests in the trees. However, the footpaths no longer exist and have been replaced by a wide cement road to allow for the transport of the oversized tourist buses. Motorbikes and golf carts are also available for rent. However, during peak season, electric rental vehicles are in short supply and tour buses are used to transport tourists on the island. The noise and pollution made by buses have an enormous impact on the island environment. On the one hand, motorcycles and golf carts are battery powered. However, since there are no windmills or solar panels on the island, they must be recharged with diesel generators. Gasoline-powered engines are used for tourist buses which is extremely ineffective. It was hoped that the island would have been sustainably maintained. However, waste rotting was found in the bushes and staff were seen incinerating garbage beside the footpath. Compared to its glossy tourist information showing the island as a paradise for both tourists and other species living there, the reality of this utopian image is the growing

pressure of environmental problems and conflicts.

What has been noted above are just the visible consequences of current development. Other unknown or unintended consequences could be enormous. Therefore, is this kind of ecotourism development on an uninhabited island deemed to be sustainable ? Is Fangji Island a success, as reported on the news, in sustainability? The lack of success on uninhabited island sustainable development is caused by both the conditions of the islands and the ultimate purposes of different stakeholders. The next section outlines three major difficulties for implementing sustainable tourism on Chinese uninhabited islands.

(1) Discrepancies in Resources: Resources mentioned here can be classified into natural resources and human resources. Lack of water and energy are the most overwhelming difficulties that restrict island development. On the other hand, the amount and reliability of scientific and financial information for uninhabited islands' sustainable tourism is low in China because they are usually located in remote areas. For example, Fangji Island is situated in Maoming City a third-tier city with agricultural and petrochemical industries. Related conservation information is provided by the government without input from local non-government organizations or from local scientific experts.

(2) Landowner's Benefit: Some utilizable uninhabited islands are owned by indigenous investors, who are the decision makers for island sustainability. In fact, these island environments have a close relationship with private investors since their diversity provides for many of their needs. However, the ultimate goal of investors is to make a profit as soon as possible. Driven by these interests, private investors may sacrifice the environment in exchange for temporary economic growth since 50 years is the maximum island leasing

period. Chen Min-Cher, the lessee of Fangji Island, said that he thought a 50-year lease of the island was enough for him because he would not be in this world after 50 years (Qilin Tavern China Current Affairs, Finance, Military, 2011, May 3th). This can be interpreted to suggest that an island developer's general operating principle is analogous to the story of 'draining the pond to catch the fish'.

(3) Collaboration among Participants: A wide diversity of participants in island conservation is necessary and should include NGOs, government, local experts, local communities and island lessee. NGOs may have different financial, technical and personnel resources compared to government departments. In China, there is no related island protection NGO because of the limited funding. Even though some fiscal expenditures have been used in island protection, this is dependent on government development budgets and is insufficient to achieve sustainability goals.

Chapter Six: Discussion

After studying and analyzing the case of Fangji Island, some important questions have arisen and will be discussed in this chapter. These include:

-- Can uninhabited islands be protected as tourism destinations?

-- Is ecotourism a “no-impact” method of saving an ecosystem?

-- Is the start of uninhabited island protection a “turning point” in China?

-- What is the ultimate purpose of the growing concern for uninhabited islands?

-- What will uninhabited islands become in the future?

-- What strategies can be suggested to bring sustainable tourism to uninhabited islands?

Island Preservation and Tourism Attraction

There is no doubt that under-developed or unexploited islands have comparative assets regarding the variety and abundance of unspoiled ecosystems. The scenery ranges from primeval forests to secluded beaches fringed by coral reefs that give tourists a unique experience compared to mainland destinations. However, can uninhabited islands be protected as tourism destinations? Pessimists may think it is impossible and opponents may challenge them with some examples of successful uninhabited island tourism destinations that are well preserved. For example, some uninhabited islands in Maldives have been leased to international tourism companies and most of their environment are well preserved.

The reason why the topic of sustainability has become popular in island destination research is because their current development is unsustainable. Policy-makers have begun to focus on island environmental protection because some small islands have already become polluted or have collapsed. Tourism companies have started setting up business on islands because vacation destinations on mainlands had been totally transformed from their original scenery and developers are looking for new pristine environments. With so many failed experiences, island exploitation could still not be stopped. We cannot expect tourist demand in these areas to be slowed down by "protection acts" during development.

However, as was discussed in other research, property rights concerning resource markets cause different problems. High natural growth rates, productivity, and marginal costs will happen under private property while "the tragedy of the commons" may occur under a common property mode (Nie et al., 2014). It seems that simply leaving the uninhabited islands alone as common lands is not feasible. As far as this research is concerned, successful uninhabited island tourism development depends highly on the involvement of local government, which is well displayed in some areas of the world, such as the Maldives (Henderson, 2008).

Currently for China, a high proportion of the utilizable uninhabited islands available for private development are tourism-oriented. Once the islands have been leased, the operation and maintenance will be entirely under the private sector's care. Given the high costs of maintenance, most of the uninhabited islands will be built as short term higher return investments such as luxury resorts, amusement parks, and yacht bases to make a profit as soon as possible within the 50-year leasing period. However, islands are still islands, and cannot be totally transformed into fully equipped communities as you

might find on the mainland. It is vital to keep in mind that any human activity depends on the consumptive use of natural resources, such as ecotourism, and cannot be sustained indefinitely unless an important principle underpins its operation. As Hopkins (2001) commented on the relationship between science and sustainable problems:

> Some portion of science must have a proactive role regarding planetary sustainability. The ecosphere cannot be managed with the political paradigms, and the political, social and economic sectors do not have the methodologies to acquire or interpret data or simulate management questions involving complex systems. Hindsight is useless for irreversible process…the need for a holistic assessment of the state of natural systems has a different trajectory than the need of science to understand individual components of natural systems. Governments now need to know the global carrying capacity (although they do not seem to realize this yet). They need to know how much waste we can put in the atmosphere, how many trees we need, how many fish we can take from the sea, and how many children we can have (Hopkins, 2001, p.253).

Proper carrying capacity should be set up to limit the number of daily inbound tourists instead of increasing the ferry frequency to satisfy the growing demand. Excessive transformation of uninhabited islands may cause irreversible consequences that are now the most profound lessons learned from previous failed uninhabited islands exploitation. However, the question is to either limit the number of inbound tourists in order to better preserve the island environment or increase daily tourist numbers to generate profit. The choice is often a simple one for business people who only lease the land for 50 years. A similar situation has been verified in Japan that shows tourism income cannot entirely

replace the government's financial support to sustain islands (Ishikawa & Fukushige, 2009). In general, a high level of public sector involvement is necessary for sustainable uninhabited island development.

Will those tiny uninhabited islands preserve themselves if we leave them alone? The answer is yes. Even though an atoll or rocks are formed by a geographic process, it can still form its own ecosystem to provide habitation for numerous species by itself as a result of certain exogenic processes. Compared to constructing artificial facilities on atolls, their natural formation mechanism will be more sustainable and well preserved in island ecosystems. The emphasis on uninhabited islands' utilization and protection is on the basis of those unspoiled natural islands. Previously remote uninhabited islands with delicately balanced ecosystems are consequently drawn into the locus of marine economic expansion. It is impossible to conceive that the utilization of .uninhabited islands, based on natural resources, will not result in any environmental impact even if it is under the most environmentally conscientious operators. As a result, peace and quiet has ended on uninhabited islands.

Ecotourism and Island Protection: Friends or Foes?

There is no doubt that the ecological footprint must be reduced to pursue sustainability, but a satisfactory quality of life for human beings needs to be secured as well. This is the current contradiction between ecological sustainability and socioeconomic sustainability. Ecological sustainability is mainly reflected in the uninhabited island protection act, setting the limits to ecological consumption, ecotourism and other types of island tourism in order to show socioeconomic sustainability. Generally

speaking, the fundamental goal is to satisfy everyone so that they can maintain their lives. However, the modern industrial world allows many people to enjoy extremely high material standards and to at least maintain their consumer lifestyle. Will it be possible to achieve both of the poles of sustainability?

Tourism that relies on the natural environment occupies a high percentage of the tourism industry while ecotourism is a fast-growing component contributing revenues to the economy. Nevertheless, the concept of ecotourism is still unclear among the public. Even though the 'China Island Protection Law' is trying to promote ecotourism in uninhabited islands, no official definition of ecotourism has been given to regulate private developers. As a result, much uninhabited island tourism in China has been labeled as "ecotourism" by developers while in reality there is no characteristic that actually matches ecotourism except enjoyment of nature in those destinations.

Ecotourism focuses on taking care of the natural environment and involving local people in catering for tourists. Apart from this understanding, whether or not ecotourism is a "no-impact" form of activity on the environment is still uncertain. As the line between ecotourism and the environment is closer than that of traditional tourism with its surroundings, it is not surprising to discover that without safeguards, ecotourism is in danger of being a self-destructive process, destroying the very resources upon which it is based. Ecotourism has a number of drawbacks. It tends to take place in areas with rare and fragile ecosystems, which leads to overcrowding, trail erosion, and pollution of those areas with more harmful impacts than in other mainstream tourism locations. Also, the behavior of wildlife can be changed due to the increasing visitors' activities (Ditchkoff, Saalfeld & Gibson, 2006). For example, wildlife tourism in Kenya has led to some of the animals

losing their instinctive hunting techniques after waiting at the same area every day for food from tourists.

Growth in ecotourism may influence the areas outside natural reserves with further tourist environmental degradation. In addition, not all of the people who participate in ecotourism are ecotourists who have a deep understanding of the principle behind ecotourism and a full appreciation of its importance. Some of these tourists may have negative impacts on a destination's fragile environment through their unintended actions.

Another problem with ecotourism is in regards to its income. Most of the ecotourism destinations in developing countries are remote, fragile, but unique and beautiful areas. Even though a part of tourism income may stay within local communities, most of this will go to the improvement of local living quality rather than be used to manage and maintain the natural areas.

The most important part of ecotourism is the scale of tourists' activities. Ecotourism activities with many tourists at a time can be merely called a small branch of mass tourism that will inevitably spoil the areas that are supposed to be protected. Strict limitations on the number of tourists is essential keep the impacts of ecotourism manageable.

Where is this Turning Point Heading?

Even though the legislation system for uninhabited islands in China was just started about ten years ago, the utilization of uninhabited islands in China has existed for thousands of years. However, since the conflict between island environments and human

interests is getting more intense and human activities are becoming unsustainable, there will be a need to take action for the protection of uninhabited islands. In many ways, the great progress on uninhabited island protection and utilization represents a turning point in Chinese history, but whether this turning point is heading to a promising future or a bottomless chasm is still unknown right now.

Legislation and Management Breakout

The issue of the Chinese Island Protection Law was a historic breakthrough in China since it fills in the blank space in legislation regarding islands, most importantly uninhabited islands. Uninhabited islands in China are no longer unknown and unmanaged. Instead, the legislation clarified that uninhabited islands belong to the state, and the State Council is supposed to take responsibility for uninhabited island issues on behalf of the state. Disorder on uninhabited islands and their unknown ownership problems will no longer exist because legal documents will make these transparent. In addition to clarifying ownership, island development plans have been added to the national economic and social development plan, which shows the government's determination and attention to island problems. In addition, the Oceanic Administration Department is empowered to manage island issues, which may avoid duplication or overlapping responsibility among different departments. This is better than the previous situation. During the time of decentralized administration there was inefficiency on islands utilization due to unclear ownership issues.

Turning Point on Economic Structure

With the largest population in the world, China is known as a labour-abundant country that leads to a cheap and unlimited labour supply contributing to China's rapid economic growth in the process of its export-oriented industrialization (Andong Zhu and Wanhuan Cai, 2012). However, within the current changes to Chinese demographics comes a shortage of and higher cost for labor, as well as an increasing demand for land resources and increasing pollution. The labor-intensive, export-oriented economy should be altered, the economic structure should be adjusted, and independent technology innovation should be promoted. As for islands, uninhabited islands especially play a significant role in the industrial transformation and upgrading process. This is occurring in several ways:

(1) Expanding the developing space: The growing demand on coastal land resources is constrained to economic development in China. Exploiting larger space for the development of the coastal economy is one of the most important parts in island utilization. For example, Japan is an island country consisting of thousands of small, remote or uninhabited islands. Since the limited resources of mainland Japan are hindering its economic growth, Japan has established a comprehensive marine and island policy system.

(2) Traditional marine industry upgrading: Traditional marine industries in China include marine fishing, marine aquaculture, processing and preserving of fish, crustaceans and mollusks, freight water transport, cargo handling, and support activities for petroleum and natural gas extraction. To achieve more sustainable development, new environmentally friendly industries can be promoted such as sea water desalination, tidal electric power

generation, wind power generation and ecotourism services.

(3) Developing high technology and tourism industry: It has been classified in the 'Island Protection Law' that environmentally friendly innovations preferred in island development. Abundant economic foundations in coastal areas of China can be a strong support for the development of islands' high-tech industry. Some of the uninhabited islands in China or in other countries have been used as bases of innovation with experimentation of many new environmental products. For example, Samso Island in Denmark produces more energy than it consumes from various renewable sources such as sun panels, windmills, and biofuels (Dw English, 2009, Dec 14th). Miyako Island, a tiny island that is home to about 100 households in Japan, is making the first ever attempt in Japan to live entirely on renewable energy (Toshiba, 2014, July 3rd). Solar panels, large capacity storage cells, and the energy management system are running the island in order to sustain the lifestyle of its habitants. Energy generated during the day is stored in cells and supplied during the night. This measure has helped Miyako Island to become self-sufficient, inspiring other small islands in Japan as well as other island regions around the world to achieve energy sustainability and contribute to the global reduction of carbon emissions by establishing a universal model for self-sufficiency.

As for uninhabited island tourism, ecotourism is promoted. Natural resources are being used to provide revenue while preserving these resources can provide a constant long-term alternative income source through ecotourism. Consequently, governments have an incentive to protect wilderness areas. To a certain extent, ecotourism is seen as a "win-win" model to save an ecosystem. For example, in New Zealand, ecotourism caters to the travelers, while at the same time ensuring environments remain in good condition.

This also puts something back into the environment in a social dimension, such as volunteerism associated with environmental knowledge education (Higham, Carr & Gale, 2001).

Changes and Transitions in Environment Protection

A decade ago, China became the world's manufacturing workshop and consumed huge amounts of resources to serve the international market with products. Not surprisingly, it has also become one of the world's most polluted countries. Previous experience tells us that all industrial nations hit an environmental turning point at some point due to the increasing demand on resources and the decreasing level of environmental quality. Most of the news about China's environment problems are negative, and the international media is filled with images showing the country's dirty air, water, and soil. Consequently, China is on the brink of environmental collapse requiring sustainable protection and strategies that need to be developed (Yardley, 2007).

The environmental protection laws in China have expanded to small islands showing a promising future in the legislation system, at least on paper. In addition to the focus on the State Council, different provinces around the country have begun establishing environmental regulations according to their local situations, similar to that taking place on island jurisdictions. In recent decades, a "Grow First, Clean Up Later" concept has "helped" China grow to be the second largest economy in the world. More recently, an awareness of severe environmental pollution and degradation has alerted the government to take action for environmental protection. A marine and island protection system is being established with continuous progress each year. Publication of the first list of 176

utilizable uninhabited islands available for lease to the private sector also expands the supervision to the public level. The involvement of public scrutiny may help improve island planning and serve as a deterrent to private owners who may have otherwise been willing to risk overdevelopment and negative impacts on the environment.

China's uninhabited island utilization application process and standards also show signs of improvement. Private actors who are willing to lease uninhabited islands need to submit a comprehensive island protection and utilization plan. The development plan must include how much of the land they want to use that is currently covered with plants, how they plan to dispose of garbage and treat sewage and the distance to the coast of any buildings they may wish to construct. Only after the plan is assessed and approved by environmental experts and related departments can the development be carried out.

All these changes indicate that China's central government is starting to take the issue of island environmental protection into consideration. However, for all the steps China is taking in a promising direction, there remain serious questions such as enforcement of the legislation, something that has always been a challenge in China. China is a late developer of environmental policy but it appears willing to keep up with the policies implemented in other developed countries. However, compared with what China needs to do, current achievements may not be sufficient. The road to sustainability is still long.

Interest or Care?

From the discussion above, the uninhabited islands' protection act is a significant shift in Chinese history. However, will this shift help China approach sustainability, or merely help it to further exploit the last undeveloped pure lands of the nation? To approach an answer to this question, another issue needs to be settled first; what is the ultimate purpose of the growing concern for uninhabited islands, 'interest' or 'care'? According to the Cambridge Dictionary, 'interest' is defined as "something that gives you what is important or necessary or helps you in some way" with a strong suggestion of profit-driven gains ("Interest", 2015). 'Care' means "the process of providing for the needs of something or severe attention to the details of a situation," and focuses more on provision of something under certain limitations ("Care", 2015).

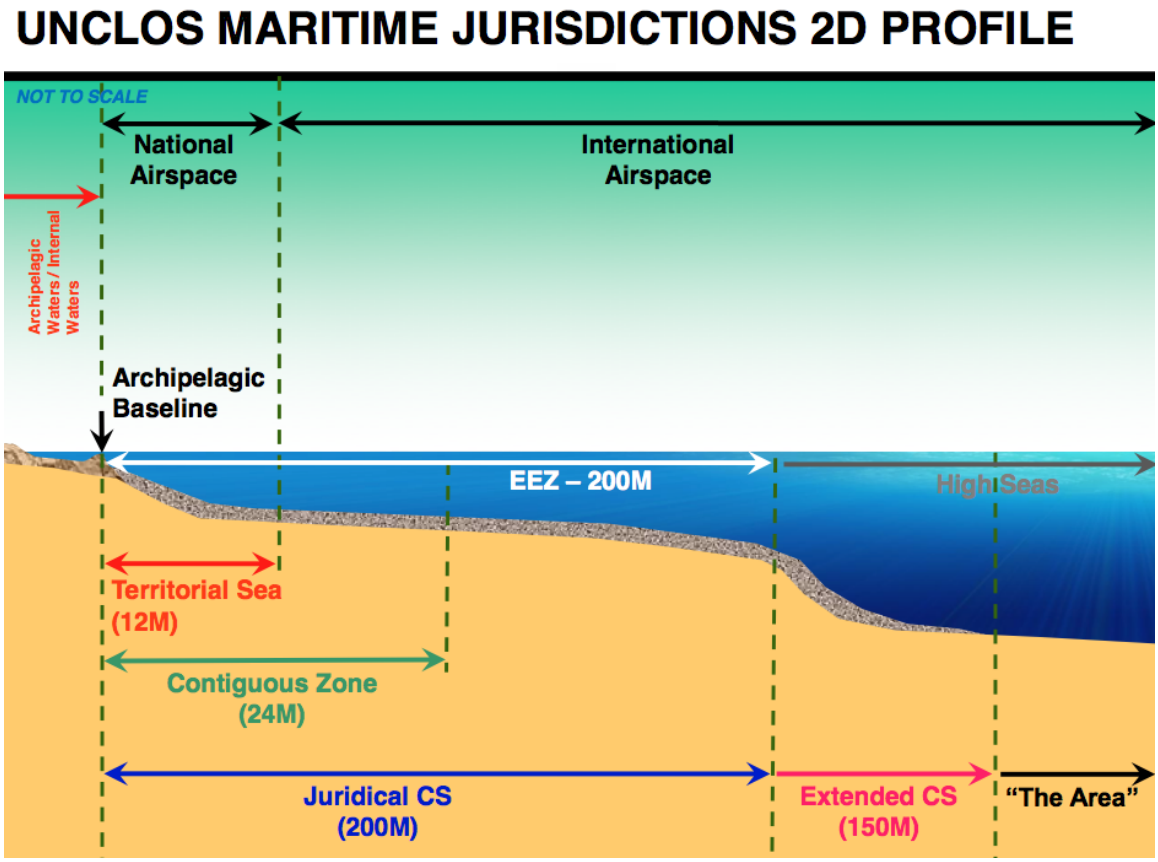
This research focuses mainly on mainland countries' awareness toward of uninhabited islands. However, it does not encompass the awareness of small island countries towards uninhabited islands. For island countries, uninhabited islands are significant components constituting their limited territory. Therefore, their interest in islands and even uninhabited islands is stronger than mainland countries. However, mainland countries still include many islands, which still need to be cared for, especially uninhabited islands along their coastlines.

Serious disputes about ocean and island jurisdictions became more significant after the adoption of the United Nations Convention on the Law of the Sea (UNCLOS) in 1982 since the agreement has an elaborate set of mechanisms to settle disputes. However, Hong

(2012) indicated that instead of managing the disputation of island sovereignty issues, it might intensify the sovereignty claims over the islands.

According to Article 121 (1) and (2) of UNCLOS, an island was given an official definition, as well as the territorial sea, the contiguous zone, the exclusive economic zone, and the continental shelf applicable to another land territory (Figure 26). Under UNCLOS, exclusive economic zone (EEZ), and the continental shelf are closely guarded assets and a state has sovereign jurisdiction and responsibility over the area's living and non-living marine resources. Because of the capacity to acquire marine space, nations have become much more competitive regarding control of islands. The basis of the conflicts over islands arises from the increasing interest in fishing waters, their strategic significance for national security defense, as well as the potentially large reserves of natural resources that can be economically exploited.

Figure 26. Cross-Sectional View of UNCLOS Marine Zones.



Source: Henry & Bensurto, 2012

With regard to uninhabited islands, the following UNCLOS statement (Article 121 (3)) is significant, "Rocks that cannot sustain human habitation or economic life of their own shall have no exclusive economic zone or continental shelf". This generates a problem in delimiting the continental shelf and exclusive economic zone (EEZ). Two questions need to be addressed from this denotation: whether an island is capable of generating its own EEZ and continental shelf; and whether an island that was formerly uninhabited could become inhabited and therefore establish its own EEZ and continental shelf. Therefore, claiming sovereignty over uninhabited islands and making them

inhabited has become very important in ocean territorial disputes.

The competition to claim uninhabited islands leads to questions of state sovereignty and how a nation establishes definitional offshore sovereignty. State sovereignty can be defined as the idea that states are autonomous and independent from others. Within their own territories, a state can choose their own form of government without any internal affairs intervention from other state (Krasner, 2001). One of the most important principle of sovereignty is the supreme political authority within its own boundaries (Baylis, et al., 2008).

Some methods of acquiring sovereignty by customary international law have been recognized as lawful to resolve sovereignty disputes, including cession, subjugation, prescription, and occupation (Fern, 2005). "The modern international law of the acquisition (or attribution) of territory requires that there be: an intentional display of power and authority over the territory, by the exercise of jurisdiction and state functions, on a continuous and peaceful basis. The latter two criteria are tempered to suit the nature of the territory and the size of its population, if any" (Case of Permanent Court of Arbitration, 1998). Accordingly, a state's international display of power and authority on any territory is critical in sovereignty disputes. As a result, various countries and regions are showing great interest in sustaining territory by employing more environmentally friendly factors. For example, the competition for territorial claims in the Arctic area among Canada, Norway, Russia, Denmark and the United States was sped up by climate change (Territorial claims in the Arctic area, n.d). The Arctic region is remarkably vast, and land boundaries between the Arctic nations are, for the most part, clearly established. However, the ownership of more than 14 million km^2 of Arctic Ocean, an area equal to

the size of Russia, is not quite as clear, especially when it is related to uninhabited islands. Because of global warming, Arctic ice is disappearing creating more opportunities for Arctic undersea oil exploitation and marine navigation, accelerating the territorial competition among nearby countries (Suzuki, 2013). For example, the federal government of Canada has promised to assert Canada's sovereignty over its Arctic lands and waters by promoting sustainability, including addressing the need for jobs, housing, and a clean environment in the North.

In China's case, since the original intention in uninhabited islands was related to jurisdictional issues, interest is linked directly with national sovereignty and territorial integrity. This means that the uninhabited island protection policies are about gaining international recognition of their jurisdiction. For example, a large project that is being conducted in the South China Sea has been described as "China's Island Factory" by the BBC News (Wingfield-Hayes, 2014). Artificial islands are being built in the South China Sea by the Chinese government, in order to assist China in its claim over marine territory. This is really just a national jurisdictional problem that is now expanding onto the international stage.

Islands have become the target of nationalist interest, because they are not only pieces of land but they also include vast surrounding areas of marine resources (Anderson, 1993). As a result, the ultimate purpose of this interest is the potential benefits that might be extracted from uninhabited island resources. The South China Sea may have as much as 11 billion barrels of oil and 190 trillion cubic feet of natural gas, which means that once territorial claim has been established of these uninhabited islands, control over resources will accompany this claim (translated from Zhang, et al., 2002). Precisely because of their

lure, China, Philippines, Malaysia, Vietnam, Taiwan, and Brunei have all shown their desire for the uninhabited islands in the South China Sea (Territorial disputes in the South China Sea, n.d). With no permanent residence, abundant marine resources, and limited accessibility, uninhabited islands are the perfect target for those nations looking for more resources. As a result, the concern for uninhabited islands will continue to grow and spread to more mainland countries.

Although the ultimate resolution of these territorial disputes may not have been established, if it is resolved, the outcome may be unsustainable. Earlier analysis in this thesis has demonstrated that China's current island protection act is still 'interest' based, instead of 'care' based, since it is driven more by economic than by social responsibility. Uninhabited islands are urgently seeking public attention to preserve their fragile ecosystems rather than having economic benefits extracted from them. Even though there is little recognized human activity on uninhabited islands, important services must still be undertaken so that the world sees that uninhabited islands are as much a cause for concern as other mainland areas or inhabited islands.

A Possible Future

Legislatively, the maximum leasing period for China's uninhabited islands is 50 years but the future of those already leased is unknown because of a lack of precedent. One possible pessimistic future with the current system may see uninhabited islands abandoned after their resources have either been fully exploited or have lost their market value.

As for uninhabited island investors, 50 years may seem to be a reasonable and standard leasing period when compared to the 70 years granted for purposed residential land, 50 years for industrial purposed land, and 40 years granted for commercial, tourism or recreational land. However, due to the high financial investment commonly associated with island development, 50 years may be too short to generate a sufficiently high rate of return because the primary purpose of normal investors is to generate income from their capital investment as soon as possible. Due to their small size, limited logistics, and low lease fee, it is easy for island investors to abandon their uninhabited islands because of mismanagement and lack of continuous investment. The island itself, including all the flora and fauna, will all be adversely affected by those financial imperatives.

As for those governmental decision-makers, related environmental solutions remain “administration after contamination”, which has been the principle for the last 30 years. The modest fees generated from uninhabited islands leases would all go towards repairing the environmental damage done to uninhabited islands. Is this the kind of economic activity that contributes to long-term, sustainable GDP growth?

The Search for Uninhabited Island Sustainability Strategies

China includes over six thousand islands as part of its territory, about 400 of which are inhabited, and the increasing demand on marine resources has raised their profile. Instead of traditional activities, the government has embraced tourism as a panacea. However, it did not take too long before it was realized that tourism is not a magic catalyst that will renew a dying island economy on a permanent basis. It can help to a certain extent, but due to its fragile environment, higher costs of development, and heavy competition

from the mainland destinations; tourism cannot be a reliable and sole supporter of overall development of island communities.

The central conclusion emerging from this thesis is that the current progress in Fangji Island is imperfect and unsustainable, and it is especially challenging for the surrounding environment. As part of the booming Chinese economy and tourism industry in the past decade, Fangji Island has been transformed from an uninhabited island to a partly exploited tourism attraction. The current planning and management of Fangji Island is based on the extraction of immediate economic benefit, at the cost of sacrificing the fundamental components that support sustainable life. No matter how much the private operator perceives the importance of natural services, direct financial benefit is the ultimate goal. This same situation will reoccur in other uninhabited islands and urgently requires long-term planning and inter-departmental cooperation to be connected.

The hope for the future of uninhabited island development in China lies in current and potential social and political development at the local and national levels. Sustainable development in uninhabited islands should be government-led, with participation from the private sector, assisted by the voluntary or non-profit sectors, and with the involvement of local communities and supported by academics throughout the process. Sustainable tourism can only be achieved if all stakeholders are involved. Different organizations have different views on what sustainable tourism means. Therefore, the cooperation and effective execution across all stakeholder groups is the key to island sustainable tourism.

Public Sector

The government could do a great deal to make uninhabited island development more sustainable through legislation and regulation since it acts as a policy maker at the strategic level, as well as a competent authority for island development. Local government also has the responsibility to implement the sustainable management strategies at the local level. A consistent thread running through all the policies on island development is ecological conservation priorities with moderate development.

Significant progress on Chinese uninhabited island development occurred in 2003 with the first appearance of a management law about uninhabited island protection and utilization in China's legislation history. The related legal system made an improvement with the launch of the 'Island Protection Law' and provincial laws. However, regarding the government's duties, there are still some negative factors that may set back island sustainable development. Principle among these is the failure to enforce existing regulations.

Legislation System

Improve The Legal System:

The history of island protection in China is short in comparison to other countries such as the USA, Japan, and Australia. This requires the government to increase the pace of legislation and improve the legal system by drawing on the experience of foreign countries. Since the launch of the list of 176 exploitable uninhabited islands, a number of private companies and wealthy individuals have been willing to invest. However, the related governmental and local uninhabited island regulatory framework is still improving.

Some conditions of the law which made the uninhabited island development ambiguous still need to be clarified for those potential lessees. For example, what are the rights and responsibilities of the lessees after the 50 year lease expires? Will the government repossess the island or give the lessee partial compensation for the infrastructure they build on the island? All these uncertainties need to be clarified and specifically written in related laws and regulations.

Detailed Development Rules for Specific Islands:

Island protection law in China involves both senior and local government, which greatly increases efficiency and effectiveness. However, progress can be made to specify the detailed protection regulation in some of the important but fragile islands. For example, a management plan for Shamrock Island led by the Texas Nature Conservancy took place in 1998 to ensure its protection from development (Cameron & Heilman, n.d). Also, Weedon Island Protection Plan was established in Florida (Hatoum & Schulten, 1995); and the Elk Island National Park Protection Plan was set up in Canada (Parks Canada, 2011). Therefore, for those islands with endemic species and fragile ecosystems, special island management plans should be adopted as in other countries where the establishment of national parks or national reserves is common practice.

Emphasize Conservation Instead of Protection:

The Chinese language has a unique beauty in its method of making written characters. As a result, the nuances between prevention and protection are very important in the regulation process. Protection means the act of protecting from injury or harm. For island resources protection, it means limiting development and utilization of the resources

of the island without any environmental maintenance. On the other hand, preservation means not only protection but also maintenance, requiring that the object is kept safe from harm or injury, as well as maintaining its original condition to achieve sustainability. For island development, preservation means maintaining the island and its resources during the process of development.

In the Chinese environment field, 'protection', is one of the most frequently used words with 'Island Protection Law'. The reason why 'protection' is widely used is that the first environmental problem in island exploitation was pollution. To prevent the environment from being destroyed by pollutants, the legislation was intended to stop or limit the polluting behavior. Protection was the perfect word at the beginning of island development. However, the importance of island maintenance preservation increased with the decline of natural resources and species. Simply preventing island pollution is insufficient to counter the rate of human impact on ecosystems; this requires the introduction of preservation. Therefore, 'conservation' is becoming more important in China's uninhabited island legislation. For example, the International Union for the Conservation of Nature (IUCN) is the biggest conservation league in the world. It was previously called the International Union for Protection of Nature (1948-1956) and the World Conservation Union (1990-2008). The change of name is about 'protection' and 'conservation' which shows the evolution in the use of these ecological concepts.

Protection, conservation, and preservation are three different emphases in three development periods. Firstly, the 'protection' period means preventing the island from any pollution during uninhabited island development. Secondly, the 'conservation' period means maintaining the island's biodiversity as much as possible by preventing any other users on the island. Thirdly, 'preservation' means keeping the island's original style and

features after exploitation and utilization.

Clarify The Object of Uninhabited Island Protection and Utilization:

According to the management law for China's uninhabited islands' protection and utilization in 2003, uninhabited islands were defined as those islands, reefs and low-tide elevations that do not have permanent residences on them. However, in the 'Island Protection Law of the People's Republic of China' in 2010, the definition of island means the naturally formed land areas that are surrounded by seawater and above the surface of the water at high-tide, including both inhabited and uninhabited islands. The question remains however, what is the object of protection and utilization? Does the object include resources on the island and surrounding water area? And what resources can be used in island development? All these questions are unclear in the current legislation.

In the current island legislation and regulation system, the certificate a lessee receives from the government about the legal territory concerns only the total land area of the exploitable island. Is it supposed to be implicit that the lessee can only use the resources within this land and only take responsibility for what is part of this land area's environment? The term 'islands' protection' mentioned in 'China's Island Protection Law' refers to the protection of the ecosystems of islands and their surrounding waters, protection of natural resources of uninhabited islands, and protection of special purpose islands. The disconnect between the definitions above and the legislation constitutes an ambiguity in China's uninhabited island sustainable development. Related legislation must clarify the use of, and the protected objects in uninhabited island development to give clear guidance to developers. However, as usual, the problem with the legislation is

in implementation and enforcement, and uninhabited islands contexts are no exception.

Establish a Coordination System:

Many administrative departments are involved in uninhabited island management in China including Ocean and Fishery, Tourism, Land and Resources, Planning, Environment, Transportation, Forestry, Public Security Border Defense, Military, Finance, Revenue and Industry Commerce. Without an effective, coordinated system, uninhabited island management in China is difficult to carry out. Unfortunately, inter-departmental management on islands is still weak in China even though the State Oceanic Administration has been empowered to undertake that role. A General Services Administration can be set up in China as in the United States. In America, the Governance Coordinating Committee (GCC) was established under the National Ocean Council. The GCC includes 18 states and tribal representatives from across the United States who serve as a coordinating body on inter-jurisdictional ocean policy issues. GCC members bring diverse experience on state, local and tribal policy issues and are critical components of the National Ocean Council (National Ocean Council, n.d). Therefore, a similar coordinating committee should be established under the China Oceanic Administration to better carry out island management in different fields.

Improve the Ecological Compensation System:

Throughout the entire development process, appropriate rewards and penalties are necessary, but Chinese island management lacks these concepts. For example, leesees who contribute to sustainable development or technology innovation should be rewarded by having a reduction in taxes or an extension to the island lease time. Conversely, strict

deterrents are required for those companies that pollute an island environment; a concept also known as ecological compensation.

In China, marine ecological compensation was used mostly in fishery resources management. However, the practice does not exist on islands (Translated from Li & Xu, 2013). The concept of ecological compensation is to charge fees to those who damage the ecosystem and then reinvest those fees into environmental protection programs. (Yang et al., 2014). Unfortunately, it is difficult to place a financial value on these environmental losses. From the experience of other, especially, developed countries, ecological compensation is about implementing an Eco-tax or environmental taxes that includes energy, transport, pollution, and a resources tax to promote environmentally friendly activities via economic incentives or penalties. Similar taxes in China such as a resources tax, urban land use tax, and an incremental tax on land value are already in effect. However, environmental taxation is absent from legislation for small islands. Therefore, an island ecological compensation system should be established as well as compensation fees, standards, objects, and related procedures to encourage more sustainable development in the private sector.

Island Assessment and Planning

Land-use planning is a tool to achieve more sustainable tourism development. Presently, many companies or institutions have been approved by the Chinese State Oceanic Administration to undertake uninhabited island assessment and planning. Apart from approved institutions, the government could give more guidance to the public on uninhabited island planning.

All the uninhabited islands in China should be classified (see Table 23), into different development levels, as is the case in other countries such as in the USA and Korea. In the United States, uninhabited islands are classified into economic-use, military-use, scientific-use, and a reservation zone. Different management mechanisms are applied to different types respectively with regular inspection by the United States Coast Guard (USCG) and scientific research by the environmental protection administration and NGOs (translated from Gao, 2013). In South Korea, there are more than 3000 islands around the main islands and approximately 2693 of them are uninhabited. In May 20015, the South Korean Marine Department stated, after comprehensive island research between 2007 and 2012, that official information on 1421 of these uninhabited islands' could be found in Naver (www.naver.com), including their name, location, area, distance to the mainland, and also characteristics of their cultural, social, biological environment. Classification of uninhabited islands is quite detailed in South Korea. Protected, prospectively protected, utilizable, and exploitable uninhabited islands are clearly classified in 'The Uninhabited Island Conservation and Management Act' in South Korea (translated from Wang, 2015).

Currently, China is carrying out a 'The Second Island Resources Integrated Survey' with the estimated completion sometime in 2016. publication of this information may not only help facilitate the public's island knowledge but also affirm sovereignty on many of these remote uninhabited islands. Additionally, the classification of uninhabited island usage types should be strictly abided to especially for those islands within nature reserves as suggested in Table 23:

Table 23 *Uninhabited Island Classifications and Related Management*

Types of Uninhabited Island	**Characteristics**	**Exploitation and Management**
Ecological	Well preserved environment Rare and endangered wildlife	Economic development was forbidden Limited construction for protecting the island
Economic	Abundant resources	Systematically develop a productive and protective economy with multiple participants' efforts
Destructive	Fragile environment Has been destroyed by human activities	Artificial environment remediation
Martial	Strategies location	Reasonable military construction

Source: Author

Designated Areas for Protection and Development

The public sector could also play a positive role by designating areas, such as National Parks and Natural Reserves, where the landscapes will be protected from tourism and other potential threats. A National Park is an area set aside by a national government

for the preservation of the natural environment. Different countries have different purposes for establishing national parks. For the United States and Canada, national parks tend to focus on the protection of land as well as wildlife, while those in Great Britain focus mainly on the land, and those in Africa focus on animals. However, the ultimate goal of all the national parks is conservation of the ecosystem, which should be a goal for Chinese uninhabited island development.

Presently, the concept of natural reserves, similar to national parks, has been used extensively in China. However, it has rarely been successful when applied to islands let alone uninhabited islands. Even though Fangji Island Sea Area has been set up for lancelets reserves, which is a second-class protected species in China, mass tourism was still allowed to develop in that area by leasing Fangji Island to a private owner.

In Canada, national parks are working to maintain or restore the ecological integrity of their territory, as well as giving visitors a chance to understand and appreciate the ecosystem (Parks Canada, n.d). Therefore, from the experience in other countries, may be useful to set up a national parks system among islands with an abundance of known and unknown resources to maintain their fragile ecosystem and deliver the concept of sustainability to tourists.

Private Sector

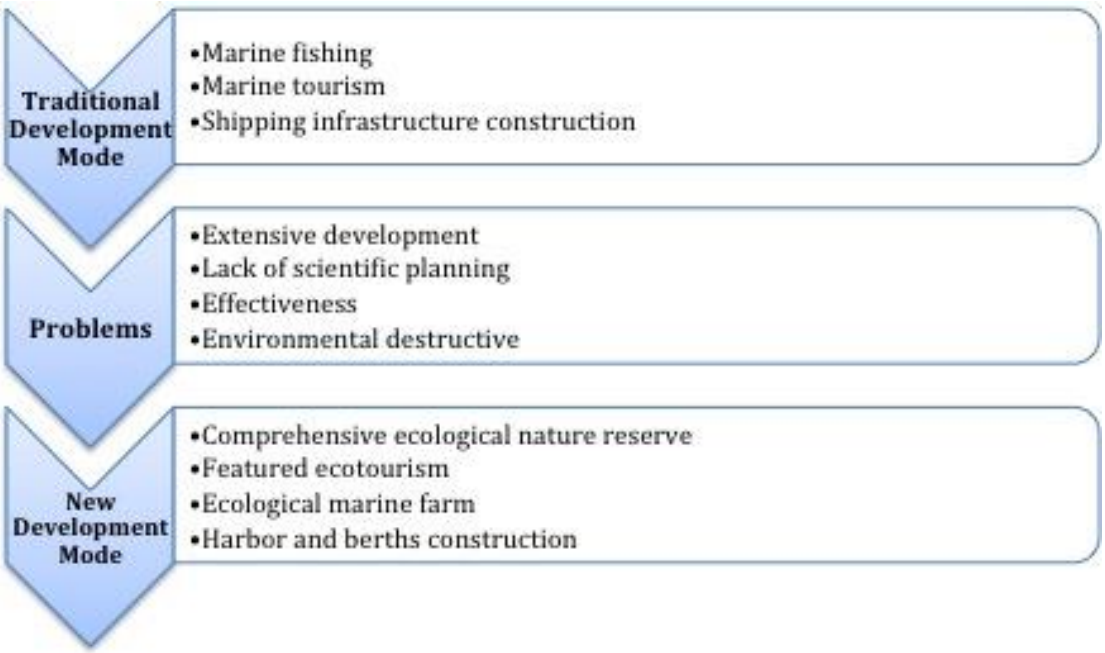
To bridge the perceived gaps between island conservation and development, and to ultimately decrease the undesirable environmental impacts on the islands during development, the importance of a preservationist attitude towards the planning and

management of island ecosystems must not be underestimated. Shaping the image of preservation consists of more than just the private lessee's efforts in operating uninhabited islands. The acknowledgment of environmental protection between uninhabited islands and tourists is significant as well.

A Diverse Development Mode

Before the 'Island Protection Law' was passed in China, i.e., without long-term planning, island exploitation was extensive and caused numerous uninhabited islands to be destroyed or even disappear. However, since the gradual improvement of island protection and utilization of the legislation system, the uninhabited island developing model is changing to become more sustainable (Figure 27). Despite these changes, innovation, diversity and unique tourism products are needed to sustain inbound tourist growth in the uninhabited island tourism sector. Tourism products should be combined with their national and local culture and islandness, which are fully evident in some of the famous island destinations such as Bali, Hawaii, and the Maldives. Currently, uninhabited island tourism products in China are mainly about building luxury island resorts with beautiful hotels or cottages combined with nice beaches, which is a reproduction of almost any coastal destinations. For example, on Hainan Island, in an attempt to imitate other successful island destinations, Hawaiian dance and Alcazar show have replaced the traditional Hainan minority dance show in some of the tourism areas. However, copying other island cultural practices is not the best way to sustain uninhabited island development in China.

Figure 27. Transformation of Uninhabited Islands Development Mode.



Source: Author

To highlight the uniqueness of any uninhabited island, feature tourism products can be created. For example, hunting tourism was promoted in Danmenshan Island, which is also an uninhabited island leased to the public sector in 2011 (Wang & Jiang, 2011). In this case, tourists can experience hunting with the company of professional hunters and hounds because the island lessee has stocked a wide range of hunting animals on the island. Relying on the uninhabited island's abundant natural forest; hunting tourism attracted many tourists due to its uniqueness. In the Mediterranean area, many small islands promote their unique tourism product according to their history or culture (Farsari, Butler, & Prastacos, 2007). For example, Hydra was named as the most beautiful town in Greece. There, the main transportation on the island is by donkey, which gives tourists a strong feeling of remote paradise.

Relationship with Tourists

Sustainable development on uninhabited islands is highly dependent on the local environment; no matter what industry you are developing. For ecotourism, providing tourists with tangible feelings of the ecosystem is necessary. Similarly, the success of the ecological fishing industry will depend on clean water and a bio-diverse sea area. As a result, to ensure the economic sustainability of both private and public sectors, limiting human activities based on natural capacity is required. As discussed previously, carrying capacity is defined as the environment's maximum load, which means the maximum population size of the species that the environment can sustain indefinitely, given the food, habitat, water and other necessities available. The carrying capacity of an environment might change over time due to a variety of factors such as food availability, water supply, environmental conditions, and living space. An uninhabited island's carrying capacity can be increased by reducing the impact of human beings on the island ecosystem. Environmental impact is determined by population, affluence, and technology, therefore, limiting consumption or improving technology may reduce the environmental impact. This requires a joint effort by the public and the private sectors.

Managing the consumption of tourists might help to reduce environmental pressure on island destinations. The effects of visitor's behavior on tourism destinations has aroused great concern during the development of the tourism industry. The behavior and attitudes by visitors towards nature is affected by traditions, cultural values, religious and philosophical beliefs, education level, age, standard of living, personal experiences and access to information. In China, rapid economic growth has brought wealth to individuals, but has resulted in environmental problems (Manrai & Manrai, 2009).

Ironically, the Chinese culture values and respects nature highly. However, the anthropocentric view that the environment exists for the benefit of people is still the critical attitude (Sofield & Li, 2007). It is generally accepted that most people in China value alleviation of poverty, economic development, economic growth and wealth creation most and the environment is seldom a priority for people (Harris, 2008). "The ever changing conditions of the environment as a result of human activities requires upgrading the society to be environmentally knowledgeable and committed" (Ramdas & Mohamed, 2014. P.381).

Therefore, interpretation and education in protected areas are increasingly the main foci by tour operators since interpretive experiences are seen as an important vehicle for delivering messages about minimal impact behavior, heritage value, conservation and protected area management (Armstrong & Weiler, 2003). Research shows that a well-conceived and delivered interpretation during an ecotourism experience may influence tourists' educational outcomes and their support of environmental conservation (Powell & Ham, 2008). Education is one of the most significant return that ecotourism gives to tourists as it improves social awareness and understanding of the island ecosystem. Customers enjoy themselves in the marine environment on the island while absorbing knowledge about marine environment at the same time. Education should be an important product sold by uninhabited island operators to the public during their tourism activities especially in China because of its vast tourism culture. As a result, tourists may start to see the benefit of marine reserves and the practice of using them in a sustainable manner.

Voluntary Sector

A non-governmental organization (NGO) is an organization that is neither a part of a government nor a conventional for-profit business. There are many different types of NGO sorted by their orientation and level of operation. The types of NGO being discussed in this research are mainly environment non-governmental organizations (ENGO). ENGOs mainly take responsibility for promoting environmental knowledge to the public, assisting policy-makers in sustainable planning and sharing environment protection technologies around the world with other ENGOs. ENGOs do play a vital role in island conservation. For example, the Island Conservation organization is an ENGO with a mission to prevent extinctions by removing invasive species from islands. In their recent report (Tershy et al., 2012), they state that they have removed 54 populations of 10 invasive vertebrates from 35 islands totaling over 520 km^2 during the period from 1994 to 2009. Their actions have helped to protect 233 populations of 181 insular endemic species and subspecies of plants and vertebrates and 258 populations of 54 species and subspecies of seabirds from the threat of local and global extinction.

In some countries, especially in developed countries, the involvement of ENGOs in environmental planning is greater than in China because of their longer and more widespread use of the legislation system. Comparatively, there are about 200 ENGOs in China such as Friends of Nature, Beijing Global Village Environmental Education Centre and Green Earth Volunteers (translated from Hu, 2009). As for Island Studies, many universities offer courses and conduct research on island-related subjects, such as geography, biology and tourism. However, few ENGOs have the power to make a significant contribution to island sustainable development and they might be criticized for

being amateurish. There is a lack of a social base due to low public awareness and limited and sporadic financial support, which also results in a talent shortage due to very little budget for staff. These factors constitute the difficulties for all Chinese ENGOs, let alone those that focus mainly on island protection. Therefore, the creation of ENGOs for island protection with proper support from the government and scientific institutes is very important for China since the demand for tourism on uninhabited islands is growing.

Chapter Seven: Conclusions

What was Studied

With the rapid development of the global economy and dwindling resources, more and more countries and scholars have recognized the importance of uninhabited islands due to their economic and military benefits. Many natural resources form the foundation of the fast growing economy. Even though most of the uninhabited islands are quite small, the large numbers of them constitutes abundant natural resources, such as fishing, energy, and marine biological products. Uninhabited islands may be considered as the last ultimate 'pure land' on the Earth with well-preserved ecosystems and less human intervention. However, the limitations and gradual devaluation of natural resources on the mainland have motivated many countries to start developing uninhabited islands. For this reason, some have established related legislation to manage these uninhabited islands and their surrounding marine resources. Examples include the 'Marine Resources and Engineering Development Act of 1966' in the United States, the 'Coral Sea Island Act 1969' in Australia, and the 'Island Promotion Act of 1952' in Japan. The most recent act on the protection of uninhabited islands is 'The Administration of the Protection and Utilization of Uninhabited Islands of People's Republic of China' issued in 2003 and the 'Island Protection Law of People's Republic of China' published in 2009. These two administrative documents have greatly shown the importance of uninhabited islands in China and have shown the motivation of the Chinese government to engage in uninhabited island management. Briefly, uninhabited islands are becoming an important issue around the world since countries are seeking undeveloped areas to balance the limited resources on their land. However, the study and development of uninhabited islands are at a very

early stage, and opportunities and challenges are bound to appear during this process.

In this research, Fangji Island, a tiny uninhabited island in China, which has been developed into a tourism destination since 2005, was chosen as a case study to examine the opportunities and challenges that uninhabited islands face during their development. As a result, significant opportunities for Chinese uninhabited islands under the current legislation system were discussed. 'The Administration of the Protection and Utilization of Uninhabited Islands of People's Republic of China' issued in 2003 is the starting point for the regulation of uninhabited islands development in China. Also, it encouraged the private sector to invest in uninhabited islands in a regulated manner. This encouragement has continued and been further improved in the 'Island Protect Law of People's Republic of China' issued in 2009. In this law, individuals or companies are allowed to utilize uninhabited islands responsibly in different categories for a maximum 50 years. This act is a great shift in the industrial transformation and upgrading process in China since it expands the space of marine economic development and promotes various industries on uninhabited islands in addition to traditional fishing and farming.

Apart from the shift in economic structure, the issue of 'Chinese Island Protection Law' was a historic breakthrough in China since it compensates for the blank space in the legislation system regarding uninhabited islands. It is specified that uninhabited islands are owned by the People's Republic of China, and the right of ownership shall be exercised by the Chinese Council on behalf of the State. Disordered utilization on uninhabited islands and their unknown ownership problem will no longer exist because a particular department, the 'Oceanic Administration Department', is empowered to manage related issues. Also, the Island Protection Law requires that any island development plan shall

follow the principles of supporting the protection and improvement of island ecosystems and its sustainable economic and social development. Renewable and clean energy is promoted in island development.

The aforementioned environmental protection act was applied to uninhabited islands and shows that the Chinese government has started to take island environments into consideration. These breakthroughs can be seen as great opportunities for the country. The development of uninhabited islands has improved the economy in nearby cities, which was shown in the case study of Fangji Island. Since 2005, when Fangji Island was first developed as a tourism destination, the economy in its nearest city (Maoming City) and county (Dianbai County) have greatly improved; the number of domestic and international tourists have increased dramatically, income from the tertiary sectors has increased consistently, urban residents' disposable income has increased steadily, and the employment rate improved. However, the challenges of sustainability facing uninhabited islands are still overwhelming.

Uninhabited islands in China are facing enormous challenges under the current development plan. It was specified in the legislative document that for the purpose of strengthening the protection and utilization of uninhabited islands, some of them are allowed to be leased for a maximum of 50 years. Any human activity will have some level of impact on the ecosystem. The increasing economic activities on uninhabited islands will increase the island's utilization and expand its developed area which will help to discover more resources, However, increased economic activity has not enhanced the island's environmental protection which is fully reflected in the case study of Fangji Island. Through the observations from the field study and the research using related secondary

sources, spatial, ecological, social, and economic evaluations were carried out on Fangji Island. The locational characteristics, land vacancy, infrastructure and labour availability, economic development of nearby areas, project feasibility and competitive environment of Fangji Island have all been studied during this research.

This research has concluded that, even though the tourism development on Fangji Island is still at the early stage, this uninhabited island and its surrounding sea area have been polluted to some degree. The average number of inbound tourists for Fangji Islands is more than 100,000 during peak season. That is to say, the average is more than 1000 tourists per day to an island that is only 1.9km^2 in size. More than fifteen percent of the natural forests on the island have been destroyed for the purpose of constructing tourism facilities such as resorts, roads, and entertainment areas in order to accommodate and serve the increasing number of tourists. These activities have resulted in an increase in soil pressure from trampling. The declining forests have caused soil and water loss on the island. Incineration and diesel burning have caused serious pollution of the air, water, and soil. Two hundred and thirty-six tons of diesel alone was consumed on the island during 2014 to power electricity generators. The impact of tourism on animals is mainly from satisfying the food consumption habits of tourists, the introduction of foreign species and overfishing. The demands from tourists for rare species and seafood have caused the degradation of island species. The oil spills from boats, waste on the beach, and sewage from restaurant kitchens have polluted the island's surrounding water. Also, the sea has been polluted by mercury, arsenic and lead during 2004 and 2005 when it was undergoing its major construction. In 2004, the water quality test in South Fangji Island Sea Area met the first standard, while the test in 2009 showed that this area was slightly polluted by

reactive phosphate. Furthermore, the harbor where the island ferries dock has been badly polluted by petroleum pollutants since 2004. Lancelets, one of the protected species in China, is the main victim of the contamination of water quality. The high-quality water of the Fangji Island Sea Area used to be one of the most suitable areas for supporting a large number of lancelets. However, research conducted in 2007-2008 has indicated that some of the areas are no longer suitable due to various changes such as bottom sediments, depth of water, transparency and algae density. The research also demonstrated that although the living environment as a whole was still acceptable for lancelets, it is likely to become worse by the rapid development of tourism, fishing, and urbanization.

During the development of Chinese uninhabited islands, it is vital to be aware that the conflict between island protection and island tourism is serious, especially for tiny uninhabited islands. Leaving those uninhabited islands alone as before will possibly lead to “the tragedy of commons”, such as illegal occupation, mismanaging resources, exploitation, and disordered human activity. However, a high growth rate, high productivity, and a high marginal costs will happen on uninhabited islands under existing private sector development because their main purpose is to generate as much income as quickly as possible. In particular, uninhabited islands in China are extremely vulnerable to human activity due to their small size and ecological sensitivity. This research has concluded that the impact of human activity on Fangji Island is just a small sample of what may be taking place. The unintended and unknown impact of these economic activities is still unclear since it will not be evident in such a short period. It is, therefore, urgent to set up a proper mechanism to take carrying capacity into consideration before any further utilization and development can take place on uninhabited islands, so that

growth can be properly managed.

A lack of a development process and guidelines may cause unsustainable development on Chinese uninhabited islands. According to the 'Chinese Island Protection Law', ecotourism is encouraged to develop on Chinese uninhabited islands, but no official definition of ecotourism and what it means and requires has been provided to investors. Without guidelines for ecotourism operation, uninhabited islands may have a high possibility of being overdeveloped in the future. Systematic thinking is needed during the planning and developing phases on uninhabited islands with the cooperation of multi-sectors including the public, private, and voluntary sectors. The Chinese government may make uninhabited islands more sustainable through legislation and regulation improvement, such as creating detailed development rules for specific islands, emphasizing island conservation, clarifying the importance of protecting the islands' surrounding sea areas, establishing a coordination system, improving the ecological compensation system, and introducing scientific planning and assessment in uninhabited islands development. As for the private and voluntary sectors, they can play a critical role to interpret the importance of ecosystem protection to tourists. Education should be the most important return that ecotourism can give to tourists in a manner that improves social awareness and is sympathetic to the island's ecosystem.

Two notions that must be recognized are:

(i) uninhabited islands are an important sub-system on Earth, and they provide valuable services directly or indirectly to human beings;

(ii) the developments on the mainland and other developing small island states is also not sustainable at the present rate of ecosystem degradation; uninhabited islands are much more sensitive to any environmental change, and require comprehensive strategies on preservation and development.

Uninhabited island development in China has just started, but it still has a long way to go. Rather than introducing environmental friendly industries to uninhabited islands, leaving them alone may be the best way to preserve the island ecosystem. What the Chinese government actually does for uninhabited islands does not match what is presented in the legislative system. The ultimate purpose of this uninhabited island legislation seems to be about improving their rapid economic development rather than protecting the fragile island ecosystem.

Limitations of this Study and Further Research

The discussion and conclusion drawn from the research could be interpreted in different ways by scholars due to some limitations of the research. Since the topic of uninhabited islands development is still new, continuous research in various disciplines is required. This study on the sustainability of uninhabited islands is just one of the many topics that are central to development studies. This focus could be expanded in the future to demonstrate what problems uninhabited islands face during tourism development and how to make uninhabited island tourism more sustainable in other locations, especially in other mainland countries where countless uninhabited islands are located.

Uninhabited Island Development Plan

Uninhabited islands in China have been under considerable pressure in recent years because of the fast growing economy, and especially because of the demand for tourism resources. A sound and sustainable development plan for uninhabited islands must be under the management of a proper planning and supervision system. At the end of the discussion of this research, some suggestions are made on how to maintain the sustainability of uninhabited islands based on the case study of Fangji Island in China. Further research that adopts different methodologies or uses different study cases is needed to provide more extensive information regarding uninhabited islands.

The Future of Uninhabited Islands

It should be noted that planning cannot predict the future, but planning can help to prepare alternatives before difficulties occur. There are many possibilities that could have an effect on the future of uninhabited islands, and it is worthwhile to conduct further research because the collapse of the island ecosystems may be at stake. For example, the trend to develop uninhabited islands into residential or commercial areas by constructing numerous artificial structures is fatal for their long-term development. Rocks or reefs in the ocean can be transformed into inhabited islands with different infrastructures, such as harbors, airports, and farms. With the increase of human activity, the distinctions between mainland, island, and ocean may be unclear in the future. These results cannot be exactly predicted and require further research.

Uninhabited Island Preservation

Research on uninhabited islands is centered on sovereignty issues and tourism development, with very little mention of environmental protection. With the growing demand for exploitation of resources, it is likely that exploitation of uninhabited islands will be the next step in the process of globalization. Traditional industries like tourism and fishing will no longer be the only activities that happen on uninhabited islands. However, any human activity may have an effect on a vulnerable island ecosystem. The question of how to secure the islands' ecosystems will possibly become a popular topic in the near future, and can be carried out through a multi-disciplinary approach drawing on the fields of biology, environment, and geography.

Personal Reflection

Since starting this Master of Arts Island Studies degree, I have realized that I am doing something unique which is not yet widely known. Before starting this thesis, I had never thought I would get into the research on ecosystems and its conflict with economic development in uninhabited islands. Because of my personal upbringing in a coastal city in China, my academic background of tourism management, as well as my experiences working in the tourism industry, I have recognized the conflicts between tourism development and the conservation of a destination environment. Even though I am not an Islander, I began the research about small and uninhabited islands on the basis of the knowledge I received from the Island Studies courses and my life experiences.

Throughout this research, I uncovered many conflicts between environment and economic income within uninhabited islands. Being a non-islander researcher, who chose to study the challenges and opportunities uninhabited islands are facing, I suffered many of my own challenges but was able to complete the research. Thankfully, I had a chance to stay on the island that I chose as a case study and got the first-hand information. Friends in China have helped me considerably in searching for Chinese academic articles and legislative documents. In doing so, I have made connections with a professor at Guangdong Ocean University who had been funded to study lancelet protection near Fangji Island. The information he provided was very helpful to my research.

Since there is limited previous research on uninhabited islands development, this thesis will be just the beginning. It is my hope that it will be a starting point for uninhabited islands studies, alerting more and more people to the importance of this subject. As one of the 1.357 billion Chinese out of the 7 billion people of the world, I want to spend my meager strength to show that the importance of uninhabited islands is more than just about the jurisdictional conflicts, and I wish a bright and sustainable future for uninhabited islands around the world.

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